PIT AND QUARRY

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DECEMBER, 1942

FOR 25 YEARS THE LARGEST PRODUCER CIRCULATION IN THE FIELD

LUDLOW-SAYLOR

CONTROLLED-TEMPER SUPER-LOY WOVEN WIRE SCREENS

for super-severe service

●

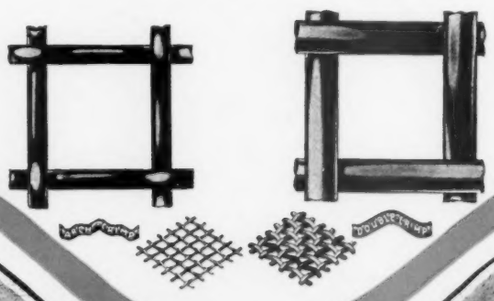
SUPER-HARD, SUPER-TOUGH, SUPER-STRONG

CONTROLLED-TEMPER SUPER-LOY WOVEN WIRE SCREENS

withstand abrasion longer—

endure vibration better—

resist fatigue to the utmost



The background at top of page shows the "Perfect" Double-Crimp Weave.

The small cuts in the center panel compare Arch-Crimp Weave and Double-Crimp Weave.

The border at foot of page shows "Perfect" Double-Crimp Steel Wire Cloth which has been hot-dip galvanized after weaving.

Samples on request.

The LUDLOW-SAYLOR WIRE COMPANY SAINT LOUIS

JAN - 1 1943

ANOTHER EASTON FIRST!

*This line drawing is reproduced from the EASTON advertisement in the April, 1942 quarry papers.

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You saw it first as an artist's sketch, when it was only an idea. Now these EASTON TR-15D double-bodied semi-trailers are working day and night at a plant which is producing stone for an important wartime project. EASTON engineering leads again . . .

It was DOUBLE or nothing!

Wartime operating conditions at a large Southern plant required that rock be hauled from shovel to crusher in comparatively large loads. The need to save substantially on fuel, rubber and man-power made semi-trailer haulage the logical first choice.

A survey by our engineers showed that EASTON semi-trailers shuttling payloads of approximately 17 tons each would provide ample tonnage at lowest cost per ton. But, at the dumping end of the route the crusher-hopper was too small to take the 17-ton load in one discharge. To meet these unusual conditions, the container, which would normally be a body of 17 tons capacity, was divided into two sections which are dumped independently. The half-loads discharged are handled easily in the small hopper opening without choking or damaging the crusher.

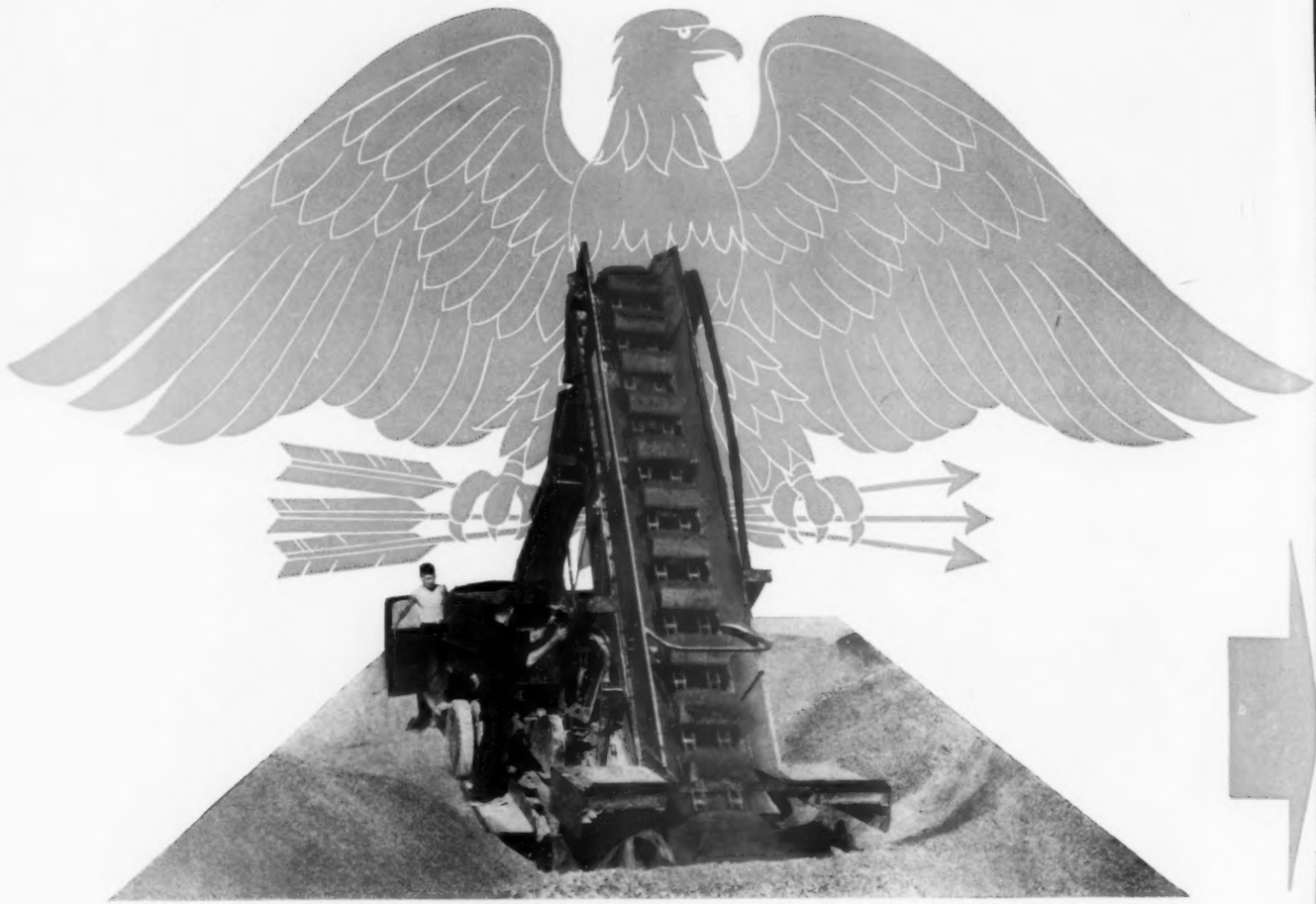
In principle the EASTON double-bodied semi-trailer is not a new idea. It was blueprinted at EASTON several years ago. It illustrates how a limitless reservoir of ideas and experience in quarry haulage enables EASTON engineers to help solve rock-handling problems. Whether you need repairs, replacements or ideas for your haulage system write to: Engineering Counsel, Easton Car & Construction Company, Easton, Pa.

B-1002

PRODUCE FOR TODAY . . . PLAN FOR TOMORROW

EASTON
INDUSTRIAL CARS
TRUCK BODIES · TRAILERS
ELECTRIC LIFT TRUCKS

PIT AND QUARRY, December, 1942, Vol. 35, No. 6. Published monthly by the Complete Service Publishing Company, 528 South Clark Street, Chicago, Ill. Subscription price $1 for 1 year in the U. S. and possessions, Canada, Central and South America; elsewhere $1 additional for each year. Single copies 25 cents. Entered as second-class matter February 28, 1932, at the Post Office at Chicago, Ill., under the Act of March 3, 1897.



BARBER-GREENE OWNERS

AND THE

WAR

You Barber-Greene owners are fortunate in having machines which have proven their ability to last for years of service. During the present emergency, it is important that every precaution be taken to keep your Barber-Greene in good condition. The delivery of repair parts is becoming uncertain. Many broken parts are due to carelessness, or improper maintenance. It is impossible to outline here all of the points to be watched. Good, sound horse sense must be exercised.

THE IMPORTANCE OF LUBRICATION

Nothing can add to the life of the machine more than thorough lubrication of the moving parts, properly executed at the proper intervals with the correct lubricants. A breakdown resulting from improper lubrication is inexcusable. Correct and systematic lubrication can be maintained with little or no loss in operating time.

OPERATE WITHIN THE MACHINE'S CAPACITY

You will lay more road or handle more material in the long run by refraining from crowding your Barber-Greene. A good operator who has the "feel" of his machine can immediately sense an overload. There are times when momentary overloads cannot be avoided, but for the long steady pull, operate within the machine's normal capacity.

KEEP YOUR MACHINE IN PROPER ADJUSTMENT

Make regular checks of all of the adjustable points on your Barber-Greene. Particularly notice chain slack and bearings. A chain which becomes too loose can climb the sprocket and seriously damage the machinery.

WATCH SUCH VITAL POINTS AS THE AIR CLEANER

Your Barber-Greene is equipped with the air cleaner suitable for the type of work done by the machine. Many Barber-Greenes operate in highly abrasive dust which can wreck an engine if it gets into the cylinders. Carefully follow the instructions on the air cleaner, oil filter, etc.

ALWAYS GUARD YOUR RUBBER BELT

Load the belt evenly. Have a hopper or some other arrangement for preventing large chunks from striking the belt at the loading end. Keep the belt properly aligned. Do not convey hot materials with your Barber-Greene Belt Conveyor unless it has a special "hot belt." (Even a special hot belt can be damaged from material above 300 degrees or by hot material which is discharged onto the belt conveyor when it is idle.)

BARBER-GREENE COMPANY, Aurora, Ill., U. S. A.

6 CONES now serve this company

SHORTHEADS make the minus half inch sizes

This four-foot **Symons Short Head Cone Crusher reduces gravel to minus half inch at the plant near Brighton, Michigan.**

The American Aggregates Corporation, one of the country's larger producers of crushed materials, is another consistent user of Symons Crushers, having six four-foot Cones installed among its various plants. Because of the satisfactory performance given by earlier installations of Standard Cones, Short Heads were later added to meet a growing demand for greater quantities of minus half inch sizes. With the Short Head, increased tonnages of smaller sized materials as now required can be quickly and profitably produced. Rehandling, recrushing and stock piling are eliminated.

If you have a growing market for finely crushed materials, investigate the advantages of the Short Head for making the minus half inch sizes.

We are proud to serve our country and to have been awarded the Navy "E" for EXCELLENCE in production.

NORDBERG MFG. CO. MILWAUKEE WISCONSIN

NEW YORK · LOS ANGELES · LONDON · TORONTO

SYMONS CONE CRUSHERS

If it's a real ROCK SHOVEL it fits into any hole!

PIT problems smooth out when you have a *real* Rock Shovel. A machine that will handle the hard jobs easily is going to sail through the easy ones. A Real Rock Shovel fits into any hole.

The Northwest Dual Independent Crowd utilizes force other shovels waste. This additional force reduces the time wasted in "second starts" and permits handling tougher digging faster. The "feather-touch" Clutch Control permits smoother handling—the easier jockeying of big chunks and it keeps the output curve high all day by reducing operator fatigue. Cast alloy steel bases and machinery side frames are better able to take the shocks of heavy digging. The Cushion Clutch relieves the strain on all parts under power when shock loads come on, reducing maintenance.

There is a booklet available on the Northwest Dual Independent Crowd. You'll be interested in its advantages. Let us send it to you—no obligation.

NORTHWEST ENGINEERING COMPANY
1806 Steger Building, 28 East Jackson Boulevard, Chicago, Illinois

NORTHWEST

. . . AND IF YOU HAVE A REAL ROCK SHOVEL YOU'LL NEVER HAVE TO WORRY ABOUT OUTPUT IN DIRT!

Here's *Exactly* Why

The CONCAVE SIDE

Saves Belts-Saves Rubber-Saves Power!

Pick up any V-belt that has straight sides. Bend that V-belt while you grip its side-walls as in the picture above. You will feel the sides of the belt bulge out —as shown in Figure 1 on the right. Clearly, that out-bulge gives the belt a shape that does not fit its sheave groove.

Now look at Figure 2. There you see what happens when you bend a belt that is built with the patented Concave sides. You get a similar change in side-wall shape—but what a different result! The precisely engineered Concave side becomes perfectly straight. There is no out-bulge:—the full side-width of the belt *uniformly* grips the sheave groove wall. This means *uniform* wear—*longer* life—a saving in belts for you, a saving in rubber for the Nation. In addition, this full side-width grip on the pulley carries heavier loads without slippage—another saving of belts and a saving in power too!

Only belts built by Gates are built with the Concave side, a Gates patent.

What Happens When a V-Belt Bends

FIG. 1

FIG. 2

THE GATES RUBBER COMPANY

Engineering Offices and Stocks in All Large Industrial Centers

GATES VULCO ROPE DRIVES

Chicago, Ill.
549 West Washington

New York City
215-219 Fourth Avenue

Birmingham, Ala.
405 Liberty National Life Bldg.

Los Angeles, Cal.
2240 East Washington Blvd.

Denver, Colo.
999 South Broadway

Dallas, Tex.
2212 Griffin Street

Portland, Ore..
333 N. W. 5th Avenue

San Francisco, Cal.
2700 16th Street

"Up periscope!" The skipper peers through the eye-piece . . . suddenly tenses. "Enemy cruiser bearing zero seven five relative . . . Stand by!" Quietly he gives the order: "Fire one! . . . Fire two! . . . Fire three!"

On both fronts—war and civilian—it's the "know-how" that counts.

Raybestos knows how. For 37 years Raybestos has pioneered in the production of friction materials for every purpose. That's why there is a Raybestos brake lining and friction *specially engineered* to meet the *exact* requirements of every make and model of machine that you operate!

Specify Raybestos for correct and dependable friction materials, and fastest deliveries.

See your local Raybestos distributor or wire us.

THE RAYBESTOS DIVISION of *Raybestos-Manhattan, Inc.*, BRIDGEPORT, CONN.

RAYBESTOS IS AMERICA'S BIGGEST SELLING BRAKE LINING

Raybestos INDUSTRIAL FRICTION MATERIALS

FOR SHOVELS • CRANES • HOISTS • TRACTORS & EARTH MOVERS

MORE TRIPS PER HOUR

Shuttle operation on narrow haul roads saves turning time. Koehring Dumptors travel forward or reverse at same speeds . . . are spotted easily and close to loading unit . . . *SAVING SECONDS EVERY TRIP.* Rock or dirt is loaded, hauled and dumped at speeds which cut seconds from every operation. Seconds saved every trip, increase trips per hour . . . yardage per shift. Koehring Dumptors have the war speed so vital today for essential military construction projects.

KOEHRING COMPANY
MILWAUKEE • WISCONSIN

Instantaneous Dumping

DUMPTORS DUMP ROCK OR DIRT INSTANTANEOUSLY SAVING SECONDS EVERY TRIP . . . INCREASING TRIPS PER HOUR.

KOEHRING HEAVY DUTY

HEAVY-DUTY CONSTRUCTION EQUIPMENT

TELSMITH PLANT

turning out 1,500,000 yds. of aggregate for NORFORK DAM

Quarry Plant Equipment by TELSMITH

One 48″ x 12′ Telsmith Heavy-Duty Apron Feeder
One 72″ x 25′ Telsmith Hercules Scalping Screen
One 16-B Telsmith Primary Breaker
One 5′ x 12′ Telsmith Double Deck Pulsator Screen
Two 30″ x 18″ Telsmith Double Roll Crushers

Sand and Gravel Plant Equipment by TELSMITH

Two 60″ x 22′ Telsmith Hercules Washing Screens
Two 5′ x 12′ Telsmith Double Deck Pulsator Screens
Two 3′ x 8′ Telsmith Single Deck Pulsator Screens.
One 57″ x 12′ Telsmith Screw Rewasher
Four No. 10 Telsmith Sand Tanks
Four 66″ x 16′ Telsmith Twin Screw Sand Classifiers
Five 30″ x 5′6″ Telsmith Plate Feeders
Three 24″ x 5′ Telsmith Plate Feeders

Total power requirements for both quarry, and sand and gravel plants..... 1250 hp.

● Down in Arkansas, near Mountain Home, the Utah Construction Co. and Morrison-Knudsen Co. are building the huge Norfork Dam. A flood control project, it is also a future source of power. The expected completion date is July, 1944.

About 1,500,000 cu. yds. of aggregate will be needed. To produce it, this combination quarry and sand-gravel plant was designed by Telsmith engineers. And all its machinery, except some conveyors and electrical equipment, is Telsmith-built.

Six 10-yd. trucks haul the limestone rock from quarry to plant. The plant's rock-crushing section turns out 140 cu. yds. per hr. Three sizes of product are made: 6″-3″, 3″-1½″, and stone dust.

35 bottom-dump cars, each of 140,000 lb. capacity, haul the material from the White River gravel bars to the plant. Its sand-gravel section has a capacity of 260 cu. yds. per hr. and makes 4 sizes—3″-1½″, 1½″-¾″, ¾″-4 mesh, and minus 4 mesh sand.

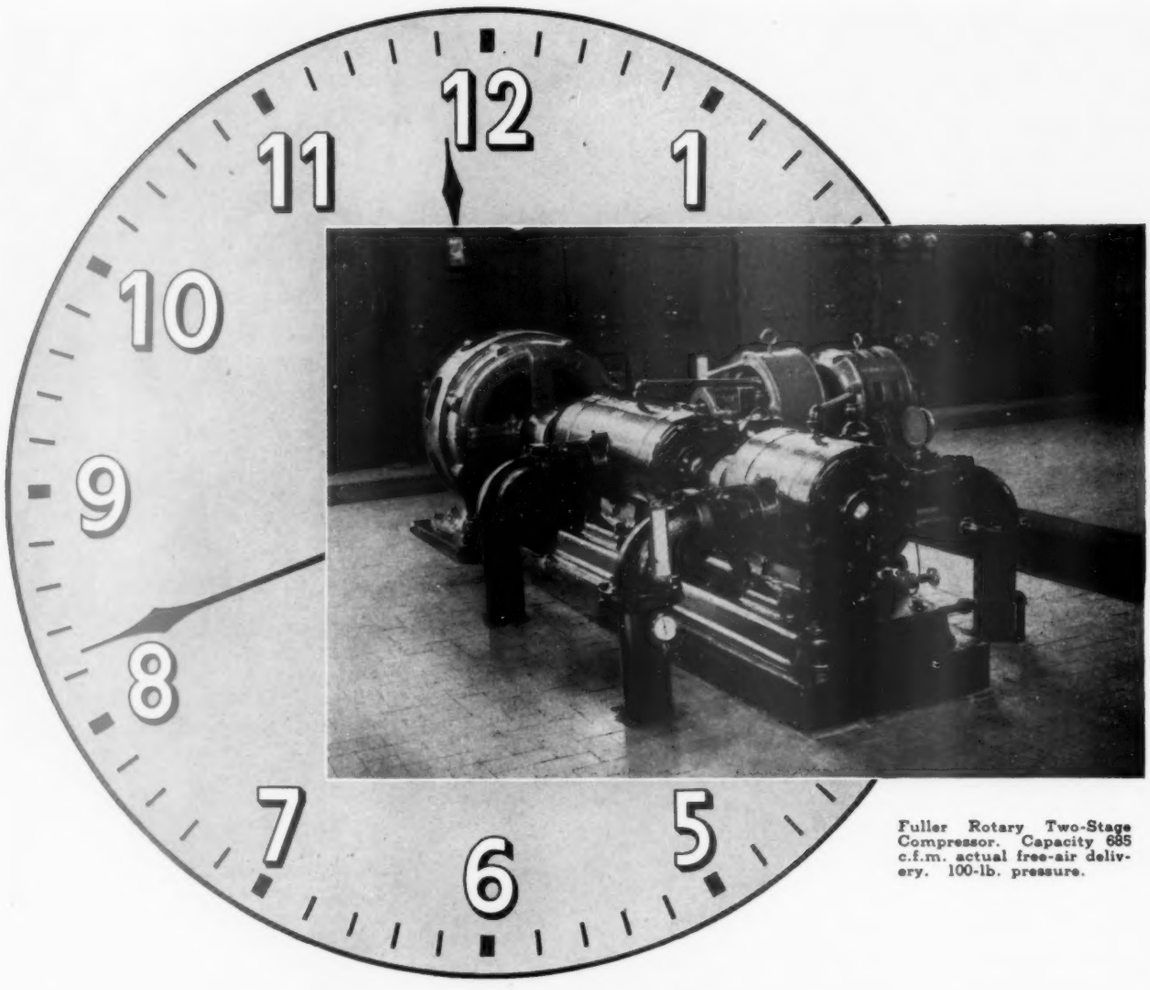
The plant's combined aggregate capacity is 8000 cu. yds. per 20-hr. day. Exceptionally efficient design, combined with automatic inter-coupled controls, make it possible to operate this large and complete aggregate plant with only about six men. Uninterrupted performance of Telsmith equipment has made it possible to exceed the planned concreting schedule.

Today's Telsmith Plants are producing under pressure, to win the war. Tomorrow's Telsmith Plants will do an even better job for you, at still lower over-all costs. Get Bulletin EP-15. Q-8

SMITH ENGINEERING WORKS, 504 E. CAPITOL DRIVE, MILWAUKEE, WISCONSIN

Cable Addresses: Sengworks, Milwaukee—Concrete, London

Room 1604—50 East 42nd St. New York City
211 W. Wacker Drive Chicago, Ill.
713 Commercial Trust Bldg. Philadelphia, Pa.
19-21 Charles St. Cambridge, Mass.
Blake Equipment Co. Columbus, Ohio
Brandeis M. & S. Co. Louisville, Ky.
Charleston Tractor & Eqpt. Corp. Charleston, W. Va.
Roanoke Trac. & Eqpt. Co. Roanoke, Va.
C. L. Preister Memphis, Tenn.
Wilson-Weesner-Wilkinson Co. Knoxville and Nashville, Tenn.
G. F. Seeley & Co. Toronto, Ont.



Fuller Rotary Two-Stage Compressor. Capacity 685 c.f.m. actual free-air delivery. 100-lb. pressure.

'Round the Clock Performance... Fuller Rotaries Give it to You

FULLER ROTARY COMPRESSORS AND VACUUM PUMPS
BUILT FOR CAPACITIES TO 1800 C. F. M. PRESSURES TO 125-LB. VACUUMS TO 29.90-IN. REFERRED TO 30-IN. BAROMETER

'Round the clock, 24 hours, day in and day out service with comparatively little shut-down or maintenance expense. That's why plant superintendents and maintenance men like Fuller Rotaries.

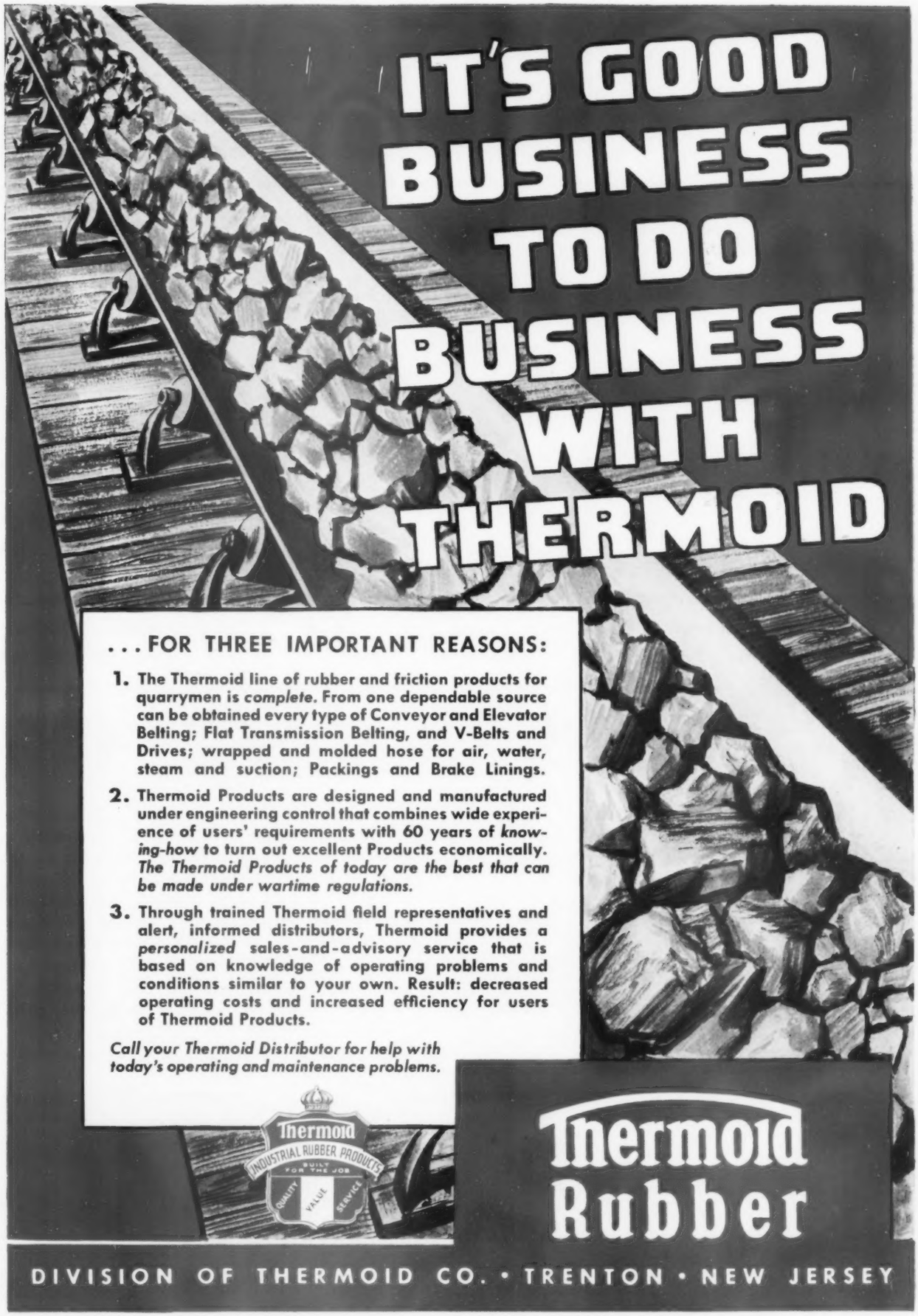
Performance records show they're truly the economical unit to install . . in a foundry $3.90 for repairs in three years; in a patent fastener plant, four years' operation: "It has run 23 hours per day almost continuously and has given no trouble." Not a cent was spent for repairs during these four years.

Repeat orders also tell a conclusive story. A steel company purchased its first Fuller in 1939 and to date has installed 14 machines. An oil company has purchased 31, a cement company 28, machinery manufacturer 27, soap manufacturer 17.

Get acquainted with Fullers. Write for new Bulletin C-5 . . . it's yours for the asking.

C-76

FULLER COMPANY
CATASAUQUA — PENNSYLVANIA
CHICAGO—Marquette Bldg. SAN FRANCISCO—Chancery Bldg.



. . . FOR THREE IMPORTANT REASONS:

1. The Thermoid line of rubber and friction products for quarrymen is *complete*. From one dependable source can be obtained every type of Conveyor and Elevator Belting; Flat Transmission Belting, and V-Belts and Drives; wrapped and molded hose for air, water, steam and suction; Packings and Brake Linings.
2. Thermoid Products are designed and manufactured under engineering control that combines wide experience of users' requirements with 60 years of *know-ing-how* to turn out excellent Products economically. *The Thermoid Products of today are the best that can be made under wartime regulations.*
3. Through trained Thermoid field representatives and alert, informed distributors, Thermoid provides a *personalized* sales-and-advisory service that is based on knowledge of operating problems and conditions similar to your own. Result: decreased operating costs and increased efficiency for users of Thermoid Products.

Call your Thermoid Distributor for help with today's operating and maintenance problems.

Thermoid
INDUSTRIAL RUBBER PRODUCTS
BUILT FOR THE JOB
QUALITY VALUE SERVICE

Thermoid Rubber

DIVISION OF THERMOID CO. • TRENTON • NEW JERSEY

What's Your No

Here are 6 of the Most Important

1 UNEXPECTED BREAKDOWNS?

How many of your key machines were designed for 24-hour-day service?

2 LOW-GRADE DEPOSITS?

Has increased wartime demand brought new processing problems?

3 LABOR SHORTAGE?

Does part of your process use men unnecessarily? Crushing is a *machine* industry!

In modern laboratories trained engineers analyze materials on machines like this X-ray spectrograph — there's no guesswork when you come to Allis-Chalmers.

WHICHEVER IT IS —

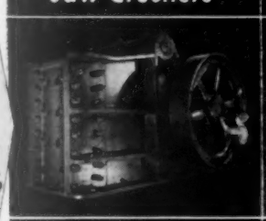
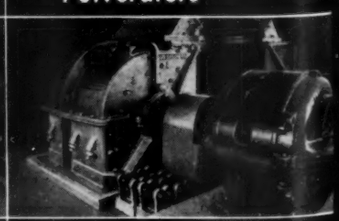
CALL ON

HERE'S SOMETHING for every crushing man to lean on these days — and lean on *hard* . . . Allis-Chalmers Cooperative Engineering. There's nothing else like it! Here's why . . .

Because it's hard to get new machinery these days, often old equipment must be made to do the job. And that's where Allis-Chalmers' vast experience and "know-how" can help you. Making all types, complete lines of equipment, our engineers analyze your problem from the viewpoint of your entire production process.

That means that Allis-Chalmers engineers are

Only Allis-Chalmers Makes a Complete Line of this Equipment!

Jaw Crushers	Gyratory Crushers	Crushing Rolls	Pulverators
			
All-steel primary and fine reduction. ¼"-12" product.	High-speed primary and secondary. 3" to 60" size feed.	6 different types. Reduction ratios from 5-1 to 10-1.	"Multi-impact" reduces non-abrasives to cubical shape.

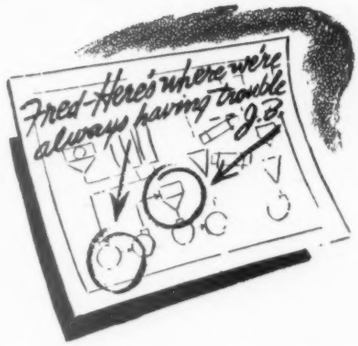
. 1 Headache? . .

Problems facing Processors today —

4 LAGGING SCHEDULES?

Maybe you have a bottleneck machine—an added machine would load up other units.

5 OBSOLETE MACHINERY?



Much equipment that "got by" in peacetime needs too much maintenance today.

6 OVERWORKED ENGINEERS?

Outside engineering cooperation may be all that's needed to get you out of a hole.

ALLIS-CHALMERS!

"complete line" engineers . . . familiar with every step in the basic processes. They know how vital it is for various machines to team-up properly — and know how to *achieve* that team-work!

And they don't have to push any one type of equipment . . . because Allis-Chalmers builds *all* types — *eight* types of screen, for example, not just one or two types!

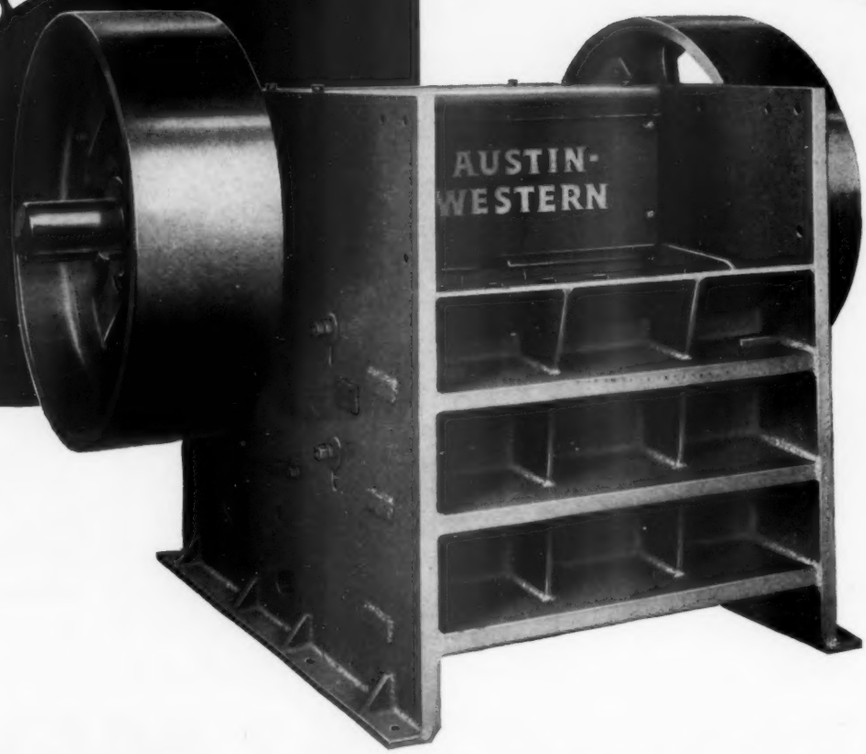
Result: Allis-Chalmers engineers have the same point of view as *your* engineers. Their objective is to give you precisely *the* right equipment for your particular needs!

Whether you have a big or a small problem, Allis-Chalmers Cooperative Engineering is yours for the asking — with no strings attached. Write, wire or 'phone your nearby Allis-Chalmers district office. Or write ALLIS-CHALMERS MFG. CO., MILWAUKEE, WIS.

A 1561-A

Blade Mills	Vibrating Screens	Log & Sand Washers	Motors & Drives	Centrifugal Pumps
For washing and disintegration of materials up to 12".	Efficient separation and dewatering — 8 different types.	All-welded modern units for materials up to 3½" size.	Unbeatable team—Lo-Maintenance Motor & Texrope V-belts.	Largest line, highest efficiencies — built with motors.

MORE CRUSHING AREA PER MINUTE



Gives A-W Crushers Outstanding Output

● Numerous construction and design advantages are responsible for the continuous full-load production of A-W Crushers . . . day after day . . . year after year. Extra large shafts and immense self-aligning roller bearings make possible smoother operation at higher speeds. Deeper crusher jaws, set at a more nearly vertical crushing angle, increase output because the movable jaw moves more nearly parallel with stationary jaw.

A-W Jaw Crushers are made in the following sizes: 10" x 16" (bronze bearing); 10" x 20"; 10" x 36"; 12" x 20"; 15" x 20"; 18" x 38"; 21" x 38".

The A-W complete line of Crushing and Screening Equipment—all engineered to step up yardage, lower operating costs and prevent expensive delays—includes Roll Crushers in 30" x 18" and 40" x 22" sizes, conveyors, screens and bins for both fixed and portable plants.

Austin-Western's competent staff of trained men will gladly assist in the economical solution of your rock crushing problems . . . whether they be large or small . . . whether the requirements call for a complete new plant or the addition of equipment to modernize set-ups now in use. THE AUSTIN-WESTERN ROAD MACHINERY CO., Aurora, Illinois.

MOTOR GRADERS
LOADERS
BLADE GRADERS
ELEVATING GRADERS
CRUSHING AND
SCREENING PLANTS

Austin-Western

DUMP CARS
TRAIL CARS
ROLLERS
ROLL-A-PLANES
MOTOR SWEEPERS
SHOVELS AND CRANES

6-DH-691 Buda Diesel powers this dragline, feeding the crusher at the Vanaken Sand & Gravel Company plant near Portland, Ore.

with **BUDA** *Diesel Power!*

THRIFTY, reliable BUDA Diesel power is a steady helper to the man who must get the *most* out of precious labor, equipment and time today. And, because long trouble-free life is designed and built into every part, these rugged engines will be contributing their cost-cutting performance to the competitive peacetime days ahead.

Steady, low-cost power for the Southeastern Portland Lumber Mills' crusher is provided by this husky 6-DH-691 Buda Diesel, at work in Mt. Hood Park

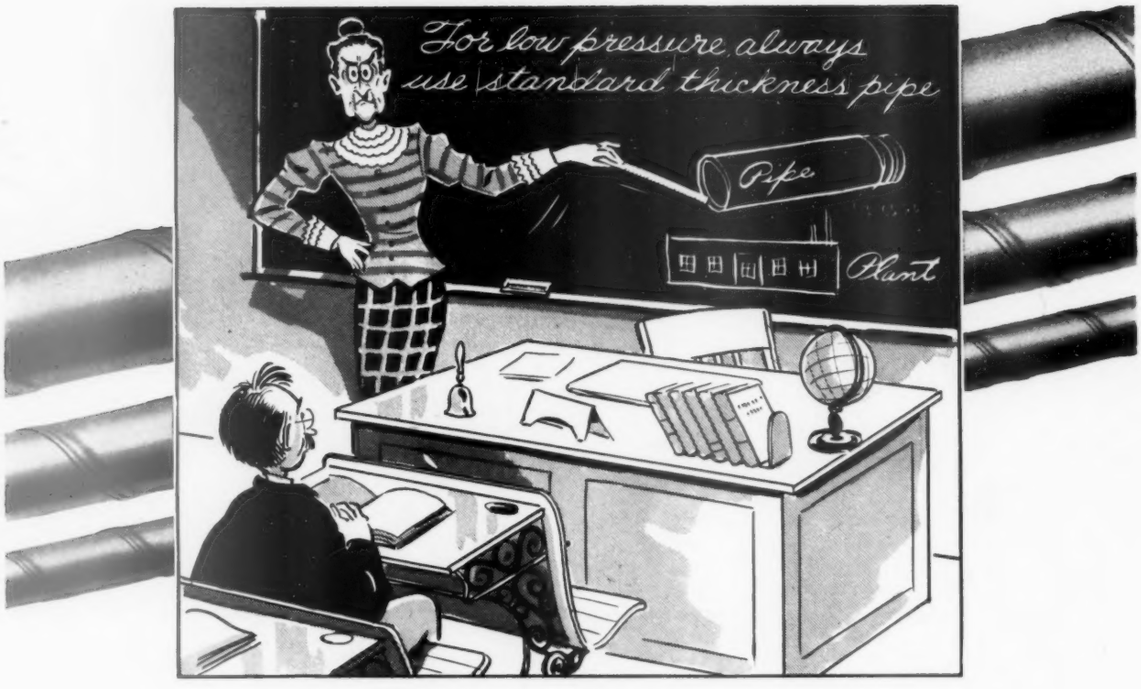
Those who can't afford to waste time or fuel —who want to invest in power that *lasts*— are turning to BUDA. Hundreds of BUDA Diesels are now at work on:

Shovels	**Crushers**	**Carry Scrapers**
Trucks	**Washing Plants**	**Draglines**
Locomotives	**Conveyors**	**Generators**
Pumps	**Drills**	**Compressors**

Write for complete information on the BUDA line of Diesel, gasoline, natural gas and butane engines—from 20 to 250 hp.

BUDA . . . for MORE HORSEPOWER HOURS per DOLLAR

THE BUDA COMPANY
HARVEY (Chicago Suburb) ILLINOIS
GASOLINE and DIESEL ENGINES—15 to 250 H. P.



Meet Miss Application *of the old school*—

SHE'S been the "school marm" of a certain well-intending school of thought for many a year . . . and you're correct in suspecting that her name is usually spelled MISAPPLICATION!

When materials were plentiful, few men questioned her doctrines. But now there is scarcity, and industry, on the alert to check all forms of waste, has discovered that *Mis-application* can be one of the worst offenders.

There are endless examples of this, but a particularly good one is found in industry's time honored practices in selecting pipe. The piping requirement may involve simply low or very moderate pressure water, air or exhaust steam, yet our old friend "Miss Application" says: "It's low pressure so just order standard thickness pipe the way I've always told you."

The fact is, however, that light but strong Taylor Spiral Pipe would in *most* cases handle the job with a big saving of now-vital steel! It's a fact too, that a big dollar saving usually results . . . that the installed cost of Taylor Spiral Pipe is often no more than half that of standard thickness pipe.

Yes, switching to Taylor Spiral Pipe saves money and conserves steel. Use it for all such services as those listed here.

Change to TAYLOR SPIRAL PIPE FOR:

- High and Low Pressure Water Lines.
- Low Pressure Steam and Air Lines.
- Steam and Diesel Exhaust Lines.
- Vacuum and Suction Lines.
- Blower Piping.
- Sand and Gravel Lines.
- Industrial Gas Lines.
- Oil and Gas Gathering Lines.
- Swing Pipe.
- Spray Pond Piping.
- Hydraulic Mining.
- Dredge Lines.

The broad range of Taylor Spiral Pipe fits it into this scheme of better pipe selection perfectly. Sizes range from 4 to 42 inches—thicknesses from 18 to 8 gauge. All types of end joints; all kinds of fittings, "specials" and fabricated assemblies are produced by Taylor Forge, assuring complete service and undivided responsibility.

TAYLOR FORGE & PIPE WORKS

General Office & Works: Chicago P.O. Box 485
New York Office: 50 Church Street
Philadelphia Office: Broad Street Station Bldg.

TAYLOR *Spiral* PIPE

CLASS OF SERVICE

This is a full-rate Telegram or Cablegram unless its deferred character is indicated by a suitable symbol above or preceding the address.

WESTERN UNION

1201

SYMBOLS

DL = Day Letter
NT = Overnight Telegram
LC = Deferred Cable
NLT = Cable Night Letter
Ship Radiogram

A. N. WILLIAMS, PRESIDENT — NEWCOMB CARLTON, CHAIRMAN OF THE BOARD — J. C. WILLEVER, FIRST VICE-PRESIDENT

The filing time shown in the date line on telegrams and day letters is STANDARD TIME at point of origin. Time of receipt is STANDARD TIME at point of destination

WU4 TWS GOVT PAID 3=WASHINGTON DC SEP 17 1942 848P
THE MARION STEAM SHOVEL COMPANY=
MARION OHIO=

AS CHAIRMAN OF THE U. S. MARITIME COMMISSION BOARD OF AWARDS, I TAKE PLEASURE IN ADVISING YOU THAT THE BOARD, IN RECOGNITION OF YOUR OUTSTANDING PRODUCTION ACHIEVEMENT, HAS AWARDED YOUR PLANT THE MARITIME "M" PENNANT, THE VICTORY FLEET FLAG AND MARITIME LABOR MERIT BADGES FOR ALL YOUR EMPLOYEES=

H L VICKERY COMMISSIONER US MARITIME COMMISSION.

THE COMPANY WILL APPRECIATE SUGGESTIONS FROM ITS PATRONS CONCERNING ITS SERVICE

The Quickest, Surest Way YOU Can Help Win This War . . .
Buy WAR BONDS — STAMPS Now!

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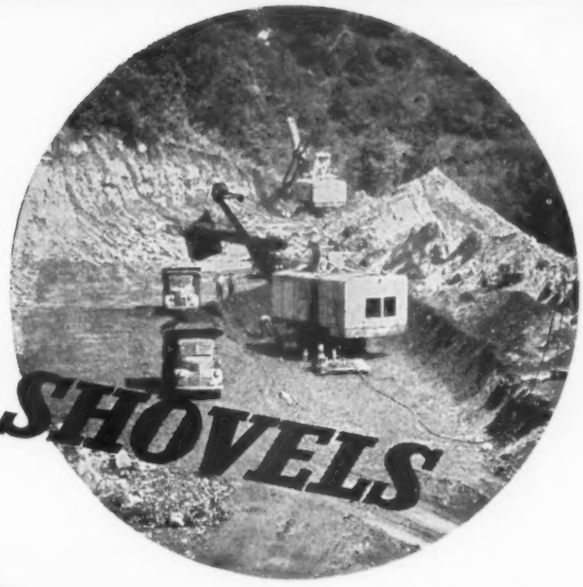

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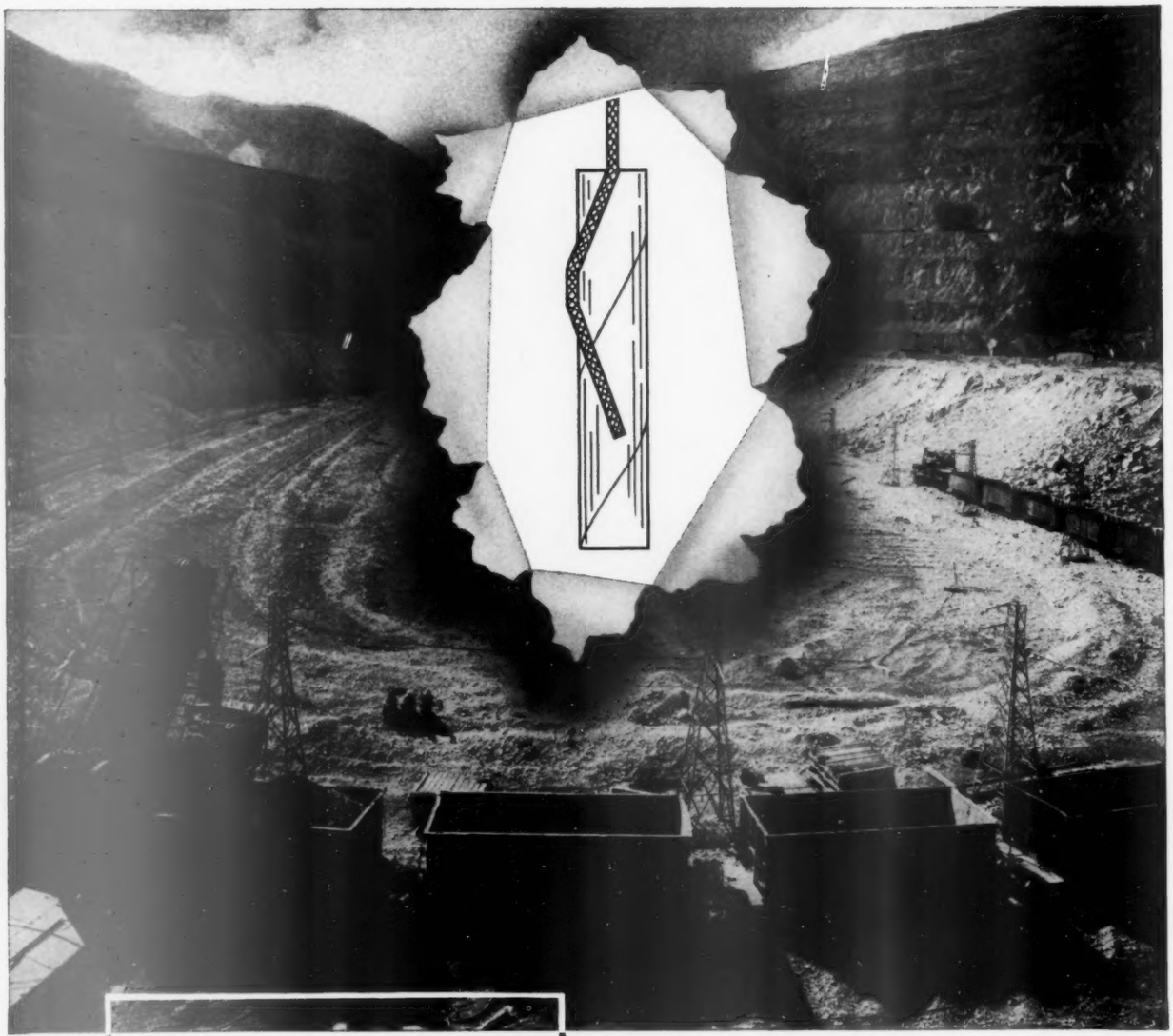

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PIT AND QUARRY

Vol. 35 DECEMBER, 1942 No. 6

CONTENTS

News of the Industry 25

The Victory Program . . . and Your Business 30

Editorial: When the War Ends 36

Three Producers "Pool" Equipment to Supply Ammunition-Depot Aggregates 37

Portable Plants Play Important Part in War-Construction Work 39

Quarrymen Discuss War-Time Accident Prevention at 1942 Safety Congress 41

Poorly-Graded Raw Materials Made to Yield Suitable Concrete Aggregates 46

Hoosier Stone Producer Develops Own Quarry-to-Crusher Transport System . . 49

Control Problems in Lime Manufacture . . 51

24-Hour Operation, Pressure Curing Enable Firm to Meet War Schedules 75

Concrete Specialties Replacing Familiar Iron and Steel Items 78

Shortage of Critical Materials Puts Concrete Bathtub in 1942 Spotlight 80

Personal Mention 60
Occupational Diseases and the Law 62
Labor Decisions 63
Traffic News Digest 65
New Machinery and Supplies 67

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PIT AND QUARRY

CHICAGO DECEMBER, 1942

W. W. Fischer Dies in Memphis After Suffering Stroke

William Walter Fischer, 62, who rose the hard way from a newsboy to become a leader in the sand, gravel, lime and cement industries died November 1 at a hospital in Memphis. His death came 15 days after he had been confined to the hospital by a stroke, during which time hope rose and fell as he fought stubbornly against heavy odds for his life.

Mr. Fischer was best known as president of the Fischer Lime & Cement Company, which he founded in 1906.

Born in Memphis, the son of William H. and Amelia Uhlman Fischer on Aug. 8, 1880, he spent his entire life there.

Earnest and thorough, Mr. Fischer left school in the third or fourth grade. Later he attended night school, but most of his education was obtained through the school of hard knocks and widespread reading. He seldom was without a book or trade journal in his hand.

While a clerk in a warehouse, Mr. Fischer saved his money conscientiously and finally managed to buy some property in Texas. There he built a number of small houses which he rented—so successfully that he eventually sold the property for $16,500, which he used to establish the Fischer Lime & Cement Company.

Always he drove himself. Intimates estimated that he averaged 12 to 15 hours daily until recent years, and never missed a day's work because of illness until 1936.

For many years, Mr. Fischer had been a leader and a guiding light in public building and housing problems and gave a great deal of his time in serving on local, state and national committees.

While president or vice president of seven firms in 1934, he was appointed to the chairmanship of a national committee to serve in the building program of the National Federation of Builders Supply Association.

At that time, Mr. Fischer was president of the Fischer Lime & Cement Company, the Greenville Sand & Gravel Company, the Central Sand & Gravel Company, the Camden Gravel Company, and the Williford Crushed Stone Company; vice-president of the Continental Piston Ring Company, and the Southern Motor Car Company.

In February, 1940, Mr. Fischer was elected chairman of the board of the Batesville White Lime Company.

Coming Events

January 11-13, 1943—Chicago. Annual meeting, Associated Equipment Distributors, Edgewater Beach Hotel.

January 25-27, 1943—Cleveland, Ohio. Annual convention, National Crushed Stone Association, Hollenden Hotel. (No machinery exhibit.)

January 27-29, 1943—Cleveland, Ohio. Annual convention, National Sand & Gravel Association, Statler Hotel. (No machinery exhibit.)

January 27-29, 1943—Cleveland, Ohio. Annual convention, National Ready Mixed Concrete Association, Statler Hotel. (No machinery exhibit.)

February 16-17, 1943—Chicago. Annual convention, National Concrete Masonry Association, Sherman Hotel. (No machinery exhibit.)

Ten-Month Building Total Exceeds Any Previous Full Year's

Total construction contracts awarded in the 37 eastern states during the first ten months of this year have exceeded the total 12-month volume of any previous year, according to F. W. Dodge Corporation. The dollar total for all building and engineering work started from January 1 through October 31 was $6,892,161,000. The previous record year, 1928, had $6,628,285,000 in contracts awarded during the entire year. This year's ten-month total was 35 per cent. greater than the figure for the corresponding period of 1941.

The 1942 record volume is comprised principally of the construction of war facilities; 85 per cent. of the total dollar volume represented public-ownership projects. In dollar volume, non-residential building increased 72 per cent. over the first ten months of 1941; residential building volume declined 13 per cent.; heavy engineering construction increased 42 per cent.

The October contract total, $780,396,000, was 8 per cent. greater than that of the previous month, and 29 per cent. greater than the October, 1941 figure. The current program of the War Production Board calls for emphasis on end products in 1943 rather than on creation of more new facilities and indicated that construction volume will taper off considerably from the 1942 peak.

$15,000 Fire Damage at Toms Brook Lime Plant

The plant of the Toms Brook Lime & Stone Company, located north of Woodstock, Virginia suffered damage by fire recently. The blaze, which caused $15,000 damage, was believed to have originated from an overheated kiln.

C. L. McKenzie, Long Prominent in Slag Field, Dies at 73

Charles L. McKenzie, 73, formerly president of the Duquesne Slag Products Company, and the Concrete Products Company of America died November 2 at Pittsburgh.

Mr. McKenzie, born in Montrose, Pennsylvania, was a graduate of Lehigh University. He was associated with the Shiffler Bridge Company from 1895 until 1900 when he became president of the Pittsburgh Construction Company upon its organization by the late J. W. Walker. During the next 20 years Mr. McKenzie organized and was president of slag, concrete and supply companies, all of which were subsidiaries of the Pittsburgh Construction Company. He retired about two years ago.

Mr. McKenzie was president of the National Slag Association for many years and was a member of the Duquesne and University Clubs, the Engineers' Society of Western Pennsylvania and the American Iron & Steel Institute of New York.

He is survived by two brothers, Edward L., of Greene, New York, and F. A. McKenzie of Huntington, Pennsylvania.

Rugen Succeeds Reed at Universal Atlas

C. D. Rugen, formerly assistant operating engineer, has been appointed operating engineer of the Universal Atlas Cement Company, United States Steel Corporation subsidiary. He succeeds H. P. Reid who has been appointed assistant to president.

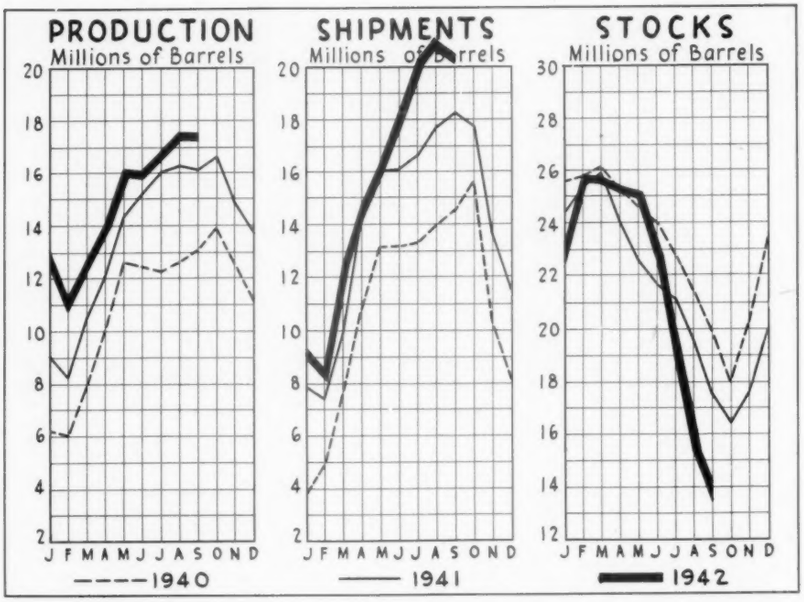
Mr. Rugen, a graduate of Purdue University in civil engineering, joined the engineering department of the Universal Atlas Cement Company in 1930 and later transferred to the operating department. He has worked in most of the company's plants, and has specialized in mill operations in the fields of grinding, burning, etc. He has also done special work on production and construction cost analysis. He is the author of *New Modern Wet-Process Cement Plant* and joint author of *How to Improve Grinding.*

Paid Circulation of Pit & Quarry Among Nonmetallic - Mineral Producers in Recent Years:

1942	(May)	6,513
1941	(November	6,179
	(May)	5,945
1940	(November)	5,397
	(May)	5,037
1939	(November)	4,641
	(May)	4,617
1938	(November)	4,496
	(May)	4,366
1937	(November)	3,971
	(May)	3,772
1936	(November)	3,654

CONTINUOUSLY FOR 25 YEARS THE LARGEST PRODUCER CIRCULATION IN THE FIELD

78% increase in 5½ Years



The Portland-cement industry in September, 1942, produced 17,527,000 barrels, shipped 20,150,000 barrels from the mills, and had in stock at the end of the month 12,656,000 barrels of cement, according to the Bureau of Mines. Production and shipments in September, 1942 showed increases of 8.7 and 10.2 per cent. respectively, as compared with September, 1941. The total production for the nine months ending September 30, 1942, amounts to 134,054,000 barrels, compared with 118,573,000 barrels in the same period of 1941 and the total shipments for the nine months ending September 30, 1942, amounts to 141,277,000 barrels compared with 124,440,000 barrels in the same period of 1941.

Louisville Cement to Pay Another Dividend

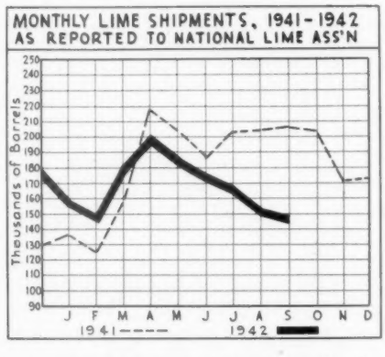
The Louisville Cement Company voted a 75-cent dividend on its common stock on October 27, bringing the total payment on each share of common stock so far this year to $3.00.

Warehouse Established to Aid Mica Miners

Establishment of a centrally-located purchasing warehouse to aid small Georgia mica operators in overcoming financial problems was recommended October 29 in Atlanta by Capt. Garland Peyton, director of the division of mines in the Georgia State Department of Mining and Geology.

Captain Peyton said such a warehouse would enable small miners to obtain adequate financial backing in addition to relieving their transportation, storage and skilled labor problems.

Federal aid in its present form, he asserted, "contains so much red tape" it would be impracticable for small operators.



According to data collected by the National Lime Association, 65 companies in September, 1942, shipped 145,683 tons of lime (100,677 quicklime; 45,006 hydrate). Reporting companies represent 41.7 per cent. of the association's total capacity of record. Based on PIT AND QUARRY'S estimates for the remainder of the industry, the total shipments for the month by all plants were approximately 400,000 tons. Shipments of lime by users for September, 1942, were:

Use	Quicklime (tons)	Hydrate (tons)
Agricultural	1,932	8,531
Building	11,297	16,941
Chemical	87,448	19,534
Total	100,677	45,006

Anaconda Acquires Basic Magnesium; Buys Eells Interest

Purchase of the controlling stock interest in Basic Magnesium, Inc., by the Anaconda Copper Mining Company was made recently. The transfer was made at the request of the United States government and private American and British interests connected with the enterprise.

Anaconda Copper obtained the 52½-per cent. stock interest in the magnesium company formerly held by Howard P. Eells, Jr. and associates, of Cleveland, for $75,000. The Defense Plant Corporation, meanwhile, bought the company's ore lands near Gabbs, Nevada, for $450,000.

J. R. Hobbins, Anaconda president, has been elected president of Basic Magnesium; Frederick Laist, vice - president of Anaconda in charge of metallurgical operations, has been named vice-president.

Basic Magnesium is operating and will complete construction of the magnesium plant at Las Vegas, Nevada, which is owned by DPC. The first unit of the plant produced magnesium on Aug. 31, 1942. Additional units have been brought in since that time, and it is estimated the entire plant will be completed by April 15, 1943.

The plant will be the largest magnesium unit in this country, and probably in the world. It will have an annual capacity of 112,000,000 pounds of metallic magnesium, and will cost in excess of $100,000,000. It covers four square miles of desert land. Its site was selected because of its immediate proximity to the government - owned Boulder Dam project, from which it takes power.

Installs Mica-Milling Plant in California

Milling machinery is being installed four miles east of Jacumba, California, by the Mica Gem Mining & Milling Corporation for processing mica.

The company, which is headed by Thomas J. Williams of La Mesa, California, with San Diego associates, has 1,200 acres under lease.

Mr. Williams reports that 55,000 tons of mica ore have been blocked out and that there is possibly another 170,000 tons in sight. He rates the material as being suitable for use in radio equipment and for gunsights. Clear sheet mica, which formerly was brought in from India, is now quoted at $15 per pound. The company is putting in a 100-ton mill to separate the mica from feldspar and silica.

J. K. Davison Purchases Pittsburgh Gravel Firm

On October 26 J. K. Davison and Brother, leading sand - and - gravel producers in the Pittsburgh area, purchased the assets of the Pittsburgh Gravel Company. Included are: two shore distributing plants (one at South Eighth Street on the Monongahela River, the other at the foot of Washington Boulevard on the Allegheny River), a 180-horsepower Diesel towboat, a derrick barge, a floating screening plant, barges, and other floating equipment.

All these facilities are being operated and all the employees have been absorbed into the Davison organization.

Erie Stone Plant Has Busy Operating Season

The Bluffton, Indiana plant of the Erie Stone Company is nearing the close of one of its most successful runs in history. For the past 20 weeks the quarry has operated on a 20-hour-a-day schedule. Production of stone for the year will total about 300,000 tons, Joe Paxson, superintendent, reports. The quarry from which the stone is taken is now 40 feet deep and covers about 75 acres.

W. F. Murray Takes New Post with Wabash Co.

W. F. Murray, vice-president and general manager of the Wolverine Portland Cement Company, Coldwater, Michigan, has announced his resignation to accept a position as vice-president of the Wabash Portland Cement Company at Osborn, Ohio.

Mr. Murray, who also was president of the Coldwater Board of Education, had been with the Wolverine company for 23 years. Roger C. Gleason succeeds him.

Opens Quarry and Plant at Kingston, Oklahoma

E. C. Schroeder & Company has opened a quarry and crushed-stone plant near Kingston, Oklahoma to provide material for a war-construction job in that vicinity. It is expected that 100 men will be employed when production reaches its peak. Edward Jenner is superintendent.

WLB Settles Wage-Rate Controversy at Monolith Portland

The National War Labor Board has directed the allocation of an increase which it had awarded the 287 employees of the Monolith Portland Cement Company, Monolith, California, September 19, to various job classifications in the plant, in accordance with the rate schedule prepared by the Board's arbitrator, William S. Hopkins.

The employees are represented by the International Union of Mine, Mill and Smelter Workers, CIO.

The parties had been given an opportunity to adjust their wage rates, either in the above manner or in accordance with the Board's original directive order of September which had provided a flat 3 cents an hour increase for all job classifications. Although 30 days was allowed, no mutual agreement was reached.

The present scale of increases ranges from 1½ to 7½ cents an hour, with the vast majority of job classifications receiving 5 cents an hour, and a number of job classifications receiving no increase. The scale was prepared by Mr. Hopkins in July, and was based on cost of living increases in the Los Angeles area. Mr. Hopkins said the varying scale was necessary because increases granted by the company in August, 1941, were not equally distributed. He stated they were "discriminatory toward the submargional groups."

The Board also directed that the management clause requested by the company shall not be included in the agreement between the parties.

New Fluorspar Plant to Start Operating Soon

A new fluorspar plant, now under construction at Los Lunas, New Mexico, will represent an investment of $150,000 by the time machinery is installed, it is reported. The plant is being built by the Zuni Milling Company, said to be backed financially by the Peerless Oil & Gas Company of San Antonio, Texas.

Those in touch with the management say it is planned to ship two 80-ton carloads of fluorspar ore daily there from Grants, New Mexico, and that the concentrate for shipment east will net two 50-ton cars daily.

Authority to construct more than 2,000 feet of spur track for sidings at the plant has been granted by the War Production Board.

Gypsum Production, Sales Show Decline in Third Quarter

The decline in mine production and the marked falling off in sales volumes of several important gypsum products during the July-September period of 1942 presented for the gypsum industry a generally bleak outlook which was relieved by only a few bright spots, notably the greatly expanded markets for wallboard and sheathing and the apparent widespread acceptance of the new, multiple-layered board products—planks and panels—announced earlier this year. This selectivity in demand is occasioned by the wide use of prefabricated products which reduce labor and erection time in wartime building. Further curtailment of gypsum markets will result from the War Production Board's Revision of Conservation Order L-41 (effective September 7) which reduces the amount of civilian construction to be allowed without specific authorization.

Continuing the downward trend that started in the second quarter of 1942, production of calcined gypsum in the third quarter fell to about 69 per cent. of that produced in the same period of 1941. Likewise, the other measure of general activity, domestic mine production, was off appreciably from output in the July-September period of 1941.

Consumption of gypsum as cement retarder, after making seasonal allowances, remained at essentially the same high rate that has persisted since the beginning of 1941. Reflecting the record cash farm income, sales of agricultural gypsum after adjustment for comparability were approximately one - eighth above data of the July-September period of 1941.

Extend Deadline for New Drill Standards

Under date of September 25, 1942, the Diamond Core Drill Manufacturers Association requested a second extension of the effective date for new production of diamond core-drill fittings in accordance with the new parts of Commercial Standard CS17-42 for the following reasons:

"The new standards do not so much result in the simplification of the present standards as specified in CS17-32 as to set up new standards of thinner wall bits. These thin wall bits are not greatly used in the United States at the present time, although they have come into extensive use in Canada, where they have already been standardized.

"It is expected that eventually CS17-42 will completely replace CS17-32, but from the nature of the art, it will take months to effect this replacement."

The National Bureau of Standards has acceded to the request, and an extension has been granted to "six months after official announcement of the cessation of actual hosbilities or to such earlier date as may be recommended by the Standing Committee."

Gravel Plant Sold to Pasadena Operators

Sale of the sand-and-gravel plant of Kuster & Waterbury to the Transit Mixed Concrete Company of Pasadena for a reported consideration of $50,000 was announced recently by J. C. Parson, new manager of the plant for the purchasers.

The property is in the Rancho El Sobrante de San Jacinto, adjacent to the city limits of Corona, California.

Considerable new equipment is to be installed at the plant as soon as it can be purchased, Mr. Parsons said.

To honor its men in the service, the Universal Atlas Cement Company has installed "the world's only concrete honor roll." It is a precast concrete slab, 3 feet by 4 feet by 1½ inches thick and is permanently embedded in a wall built of the same material. The colors for the red border, blue star and white field were made by exposing aggregates of those colors in a matrix of cement. No artificial color pigments were used. Ceramic aggregates were used for the blue star, vitrified glass for the red border and quartz for the white field. It was produced by John J. Earley, Washington, D. C.

Vast Construction Opportunities Seen After End of War

Vast post-war opportunities for the construction industry, especially in the building of moderate-priced homes, were pictured by Dan W. Kimball, president, Associated General Contractors of America, who recently discussed the outlook over the Mutual Broadcasting System in the U. S. Chamber of Commerce "Victory and You" series.

Mr. Kimball pointed out that while many industries will have to re-tool before returning to peacetime pursuits, the building field will be able to proceed immediately.

Estimates point to the need for 1,000,000 new homes a year for many years after the war, he said, with the potential market especially attractive in the $2,500 to $3,000 price class. In addition, there will be a vast volume of replacement, rehabilitation and repair work in both farm and urban building.

"Our prediction is that construction employment will be good after the war," Mr. Kimball declared. "This hinges largely upon the probable maintenance of substantially full general employment, for which the national income will total around 110 billion dollars. In 1932 our national expenditures totaled approximately 54 billion dollars, in 1929 it was almost 100 billion dollars, and in 1941, with war spending it was 118 billion dollars."

Residential building represents more than seven per cent. of the national income, he said.

Post-war construction will benefit from the techniques developed during the course of the conflict, Mr. Kimball asserted. "The industrial pattern of future housing construction will be first simplification and standardization of the materials used; second, simplification and mechanization of the processes of assembly; and third, attainment of volume production. New materials for all types of construction are today having their first genuine opportunities. Overly stringent building codes are now being revised; realty taxation is being moderated; blighted areas are now available as cheap land to be converted to new social and economic uses."

The Union Sand & Gravel Company of Morganfield, Kentucky, has filed notice with the secretary of state at Frankfort, Kentucky, that it is dissolving as a corporation.

CURRENT BUSINESS INDICATORS

The month just past was probably the most eventful since our entrance into the war. The biggest news was undoubtedly the successful offensive carried out by the American and British forces in Africa. The hypodermic effect of this development and the Navy's reported smashing of the Japanese invasion fleet in the Solomons was evidenced by the upsurging wave of elation which swept the country from coast to coast, despite the President's cautioning against over-optimism.

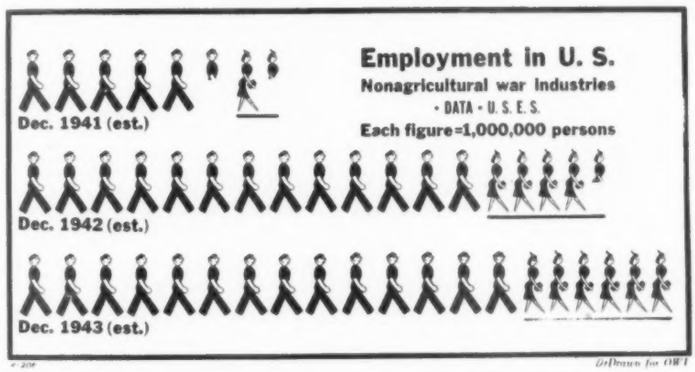
On the production front the War Production Board finally announced its long-awaited Controlled Materials Plan. The principal purpose of the plan is clear and unassailable—to assure maximum production of military and essential civilian goods through the most effective utilization of our supplies of critical raw materials. The first "controlled materials" to come under the plan are steel, copper, and aluminum. For those materials the new CMP will supplant the priorities system and the production requirements plan partially during the second quarter of 1943 and completely after July 1. The distribution of non-controlled materials will continue to be made under the priorities system.

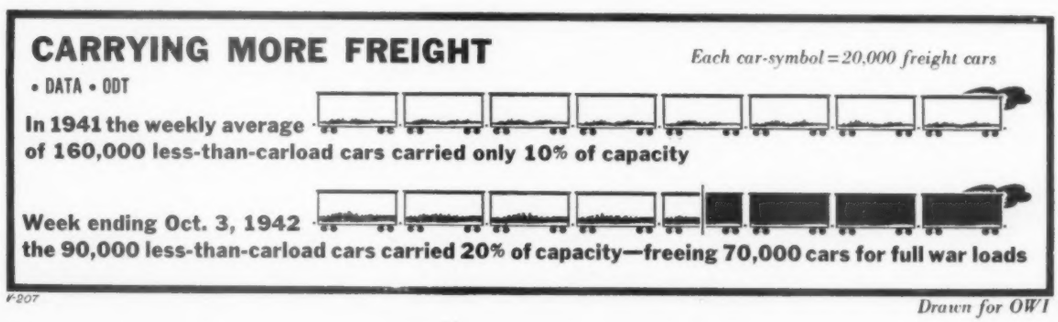
Here, briefly, is the way in which the CMP is expected to operate: There will be seven claimant agencies—the Army, Navy, Maritime Commission, the Aircraft Scheduling Unit, Lend-Lease, Board of Economic Warfare, and the Office of Civilian Supply. Prime contractors will furnish to each of these agencies time schedules of scarce-materials requirements for themselves and their suppliers for each type of product or part being produced. These bills of materials will be assembled by the claimant agency and submitted to the WPB, which will make any adjustments in the program necessary to bring anticipated supplies into balance with stated requirements and will make allotments of these materials to each claimant. The latter, in turn, distributes these allotments to its prime contractors, assigning allotment numbers or "certified checks" for specified quantities of materials in specified periods of time. These allotment numbers are then passed on to the sub-contractors, thus completing the CMP cycle.

Although it is obvious that it will be several months before bills of materials for many types of munitions and construction will be anything more than rough estimates, CMP must be considered a step in the right direction. The basic question, however, as has often been pointed out on this page, is how much farther the WPB will be willing to go in exercising the function it has often asserted but never definitely settled as its own, that of scheduling the production of all munitions and essential civilian items in every plant in the nation. Unless the controlled materials are planned to flow to balanced quantities of components and parts of fighting weapons, we shall continue to make far from the most effective use of our resources. Admittedly the controls called for constitute a tremendous undertaking, but the vital nature of the job is unquestioned. Although the plan has generally been interpreted by the press as embracing this complete scheduling responsibility, it is not officially part of the plan, nor has any official announcement been made concerning the extent to which it will be undertaken.

If the WPB fails to take some definite action along this line in the near future, the function will remain in the hands of the armed forces by default, despite their alleged inadequacy to handle the problem satisfactorily.

One inevitable result of the critical shortage of many materials and, to a lesser extent, manpower, will be the virtual elimination of consumers' durable-goods production, except for such quantities as are required by the armed forces. Director of Civilian Supply Leon Henderson has stated that only about one per cent. of 1943 supplies of steel and copper will be available for civilian output. Symptomatic of this policy to curtail non-war production is Mr. Nelson's organization of a Facility Clearance Board with authority to review and veto every construction project, costing over $500,000, on the basis of its necessity to the war effort, consumption of critical materials, and manpower demands. Similar authority for projects valued at less than half a million dollars will be exercised by a Facility Review Committee. The power of these groups over private and public building extends to projects already under way, and those approved but not yet begun, as well as to proposals for new construction.




CARRYING MORE FREIGHT
• DATA • ODT
Each car-symbol=20,000 freight cars
In 1941 the weekly average
of 160,000 less-than-carload cars carried only 10% of capacity
Week ending Oct. 3, 1942
the 90,000 less-than-carload cars carried 20% of capacity—freeing 70,000 cars for full war loads
Drawn for OWI

The Victory Program ★ ★ ★ ★ *and Your Business*

CEMENT PRICES OUTSIDE SELLING AREAS.—A new alternate method for pricing cement shipments to war construction jobs outside the manufacturer's normal selling area was established October 23 by the Office of Price Administration.

The action was taken because of the necessity for making sales of cement from one so-called cement-deficiency area to another, and allows the manufacturer, until June 30, 1943, to charge the highest price f. o. b. mill, realized during the first 15 days of March 1942 on a comparable sale irrespective of whether the sale was made inside or outside his normal market area.

Use of this alternative, set forth in Amendment 1 to Maximum Price Regulation 224 (Cement), is permissible only when the pricing method is indicated on the billing, the provisions in the original order ensuring the movement of the cement to war procurement agencies are complied with, and the War Production Board certifies to the manufacturer and to OPA that the cement should not be shipped from a Bureau of Mines District having a surplus of cement and that both point of shipment and point of destination are in a Bureau of Mines District or Districts where a deficiency of cement exists or is imminent.

Concentration of war-essential construction in areas of the country not equipped to manufacture the necessary volume of cement created the so-called cement-deficiency areas. Other areas having quantities of cement available for shipment into deficiency areas had not customarily sold cement to such distant points and, under the normal pricing mechanism, were prevented from doing so profitably. Regulation No. 224 was issued September 17 to cover this.[1]

Since the regulation was issued cases have arisen in which the War Department and WPB found it necessary to move cement from one deficiency area into another area where a deficiency existed or was imminent. Such movements could not be made under the regulation as originally issued, since the maximum price a manufacturer could charge on an out-of-area shipment gave him a lower realization than his normal shipments. This was so because out-of-area shipments were merely disposition of marginal production.

The amendment was made retroactive to September 23, the effective date of Regulation 224.

CONSTRUCTION EQUIPMENT ALLOCATION.—All construction machinery and equipment was placed under allocations control November 9 by the Director General for Operations, with the issuance of Limitation Order L-192, stopping production for civilian use of certain types of equipment needed for the armed services. The restricted machinery, as listed in Schedule C of the order, will be manufactured hereafter only for use of the military.

Civilian purchase and use of new construction equipment on Schedule A for private account, after November 15, will be permitted only under an authorization from the Director General for Operations. Beginning November 15 the industry will operate on production schedules to be determined by the War Production Board.

A vertical integration of the industry from top to bottom under a system of production quotas will supplant the limitation orders at present in force. The new order (L-192) supersedes Limitation Orders L-82 and L-82-a, which respectively restricted production and distribution of power shovels and cranes and of rubber-tired construction equipment.

A drastic but flexible war-time control will be applied to construction machinery. Factory output will be controlled by direct allocation of the finished units to authorized users, chiefly the war procurement agencies within the government and their contractors and agents.

Excavating and construction equipment and machinery of many descriptions is classified under Schedules A, B and C, which have been arranged in accordance with the degree and nature of the controls and restrictions applied to the separate schedules.

By requiring registration of each unit of equipment of the types listed in Schedule A, when in the hands of private owners, a control is maintained over the location and use of essential machinery. The purpose of registration is to enable prospective buyers, lessors, or other authorized users to negotiate for and obtain the equipment that has been released or which has become idle upon completion of the project to which it was allocated previously.

Regulations previously imposed under L-196 to require registration of used construction equipment and reports of change of status are retained unchanged.

As a condition to the resale, rental and use of such equipment (Schedule A) by private owners, they will be required to file notice 30 days prior to sale, lease or use on any other project. From WPB-1159 (the same as that required in L-196) is prescribed for that purpose. It must be completed and returned to the Used Construction Machinery Specialist at the Regional office of the War Production Board in the area where the equipment is located. (This requirement does not apply to equipment listed in Schedule B.) Form 1159 is reproduced on page 31.

Producers of construction machinery will obtain their iron, steel, aluminum, copper and other critical materials by allocation. Accordingly, their own production schedules will be regulated to keep fabrication and assembly in balance with the flow of materials. The amounts of metal or other critical materials allocated for their operations will be only as much as are called for by their authorized schedules.

New construction and excavating equipment, if on Schedule A, will automatically be reclassified as "used" whenever it is transferred or removed to another job or location after being initially used on the project to which it was allocated when new.

Included in Schedule C—military only—are graders, ditchers, dredgers, rollers, conveyors, derricks, concrete-handling equipment of several types, mixers of various kinds, and other important pieces of construction equipment. There are in all 48 items in the list.

Schedule A comprises a list of various types of new machinery and equipment that may be bought, rented and sold by individual contractors and construction companies or other persons for their own account under an authorization by the Director General for Operations. Items which appear in both Schedule A and C, however, may not be ordered, sold or

[1][See *Cement Prices Will Cover Transportation Increases*, PIT & QUARRY, October 1942, pages 32-33.—ED.]

THE WAR EFFORT

MANPOWER	Number	Percentage Change from October 1941
October: 1942:		
Labor force	54,000,000	— 0.2
Unemployed	1,600,000	—59.0
Employed	*52,400,000	+ 4.4
Nonagricultural	*41,900,000	+ 2.4
Male	29,200,000	— 1.4
Female	12,700,000	+12.4
Agricultural	*10,500,000	+12.9
Male	8,900,000	+ 7.2
Female	1,600,000	+60.0

FINANCE**	
Authorized war program, July 1940-October 1942	$240,000,000,000
Total disbursements, July 1940-October 1942	R55,701,000,000
October 1942	R 5,722,000,000
September 1942	R 5,458,000,000
Sales of War Bonds—	
Cumulative, May 1941-October 1942	9,945,000,000
October 1942	814,000,000
Quota for October	775,000,000

PRODUCTION	
Government commitments for war plant expansion: June 1940-Sept. 30	***$13,474,000,000
Private commitments for war plant expansion; 10,239 Certificates of Necessity approved, June 1940-September 30	3,444,000,000
Man-days of idleness on strikes affecting war production, January-September 1942	1,715,932
Percentage—time lost to estimated time worked	8/100 of 1%

		Percentage Increase from Like Month Last Year
All manufacturing industries—August:		
Average weekly earnings	$39.54	23.9
Average hours worked per week	42.8	4.9
	Index	
Cost of living (1935-39 = 100):		
May 1942	116.0	12.7
September 1942	117.8	9.0
October 1942	119.0	8.9

*New series starting August 18.
**Preliminary. Includes funds made available by Congressional legislation and by Government corporations.
***Preliminary. Revised series starting Oct. 13.

delivered for civilian use nor will an authorization be approved.

The Director General for Operations, at any time on two weeks written notice, may require the owner to sell, lease or use his Schedule A equipment as directed, if such equipment was purchased or procured in new condition after November 15.

Schedule B contains a list of smaller, less critical units of equipment and machinery such as jack hammers, rock drills, paving breakers, pumps, carts, material-handling machinery and numerous other items.

Products in Schedule B are removed from the restrictions that apply to all other types of equipment and machinery, in two important respects, namely, (1) the procedure for placing and receiving orders (Par. d), and (2) restriction on resale, rental and use, many of which may be classified as "off the shelf" equipment.

When a company or person other than a contractor or agent acting for the armed services or other government procurement desires to place an order for new equipment listed in Schedule A, the prospective buyer must first obtain authorization from the Director General for Operations through a Regional office, using application form PD-556. Producers are forbidden to accept such an order unless accompanied by the required authorization.

Inventory reports will be required from producers on the 15th day of each month on form PD-697, covering finished unsold inventory, production schedules and shipping schedules. Producers' inventory reports must include new equipment then in the possession of their dealers and distributors.

In order that producers may be informed of the status of dealers' and distributors' stocks, similar reports of their unsold inventories will be furnished by them to the producers concerned on the fifth day of each month.

New machinery and equipment in Schedule A, when in the hands of any private owner, may be used only on the project described in the authorization to purchase, which would be obtained through filing of an application on form PD-556.

Repair parts for equipment in use on "essential projects" in the United States and Canada will not be given an individual preference rating, but automatically are assigned the highest rating of the project, subject to restrictions upon amounts, shipments and deliveries.

Delivery of new equipment already on shipping schedules of producers and distributors previous to November 15, and previously authorized under L-82 and L-82-a, the order provides, "shall be deemed to be authorized, unless the Director General for Operations shall direct otherwise."

Order L-192, superseding L-82 and L-82-a, cancels all releases of equipment granted under the two previous orders on which shipment was not made before November 15.

The three schedules, A, B, and C, follow:

SCHEDULE A

The items of construction machinery and equipment appearing in Schedule A are subject to all the paragraphs of this order.

Items which appear in both Schedules A and C may be ordered and produced only for military purposes as stated in paragraph (d) (1) (ii) and (e) (4).

Angledozers and modifications thereof.
Batchers, construction-material.
Batching plants, construction type.
Bins, construction-material, portable.
Bins, construction-material, stationary.
Brooms, contractors' rotary.
Bulldozers and modifications thereof.
Cranes, crawler-mounted, power.
Cranes, tractor-mounted, power.
Cranes, rubber-tire-mounted, power.
Crushers, jaw and roll, portable type.
Crushing plants, portable type.
Derricks, guy.
Derricks, stiff-leg.
Distributors, bituminous.
Ditchers, ladder.
Ditchers, wheel.
Drag-lines, *see* Cranes.
Drag-lines, slack-line.
Drag-lines, walking.
Dredges, and dredge equipment.
Drilling machines, blast-hole drills.
Drilling machines, core drills.
Drilling machines, rock, portable-mounted.
Driers, construction aggregate.
Earth-boring machines.
Excavators, *see* Power shovels.
Fine graders and subgraders, self-propelled.
Finishers, concrete.
Finishers, bituminous paving.
Forms, concrete road.
Graders, blade or pull type, earth-moving.
Graders, elevating, earth-moving.
Graders, self-propelled earth-moving.
Grapples.
Hammers, pile.

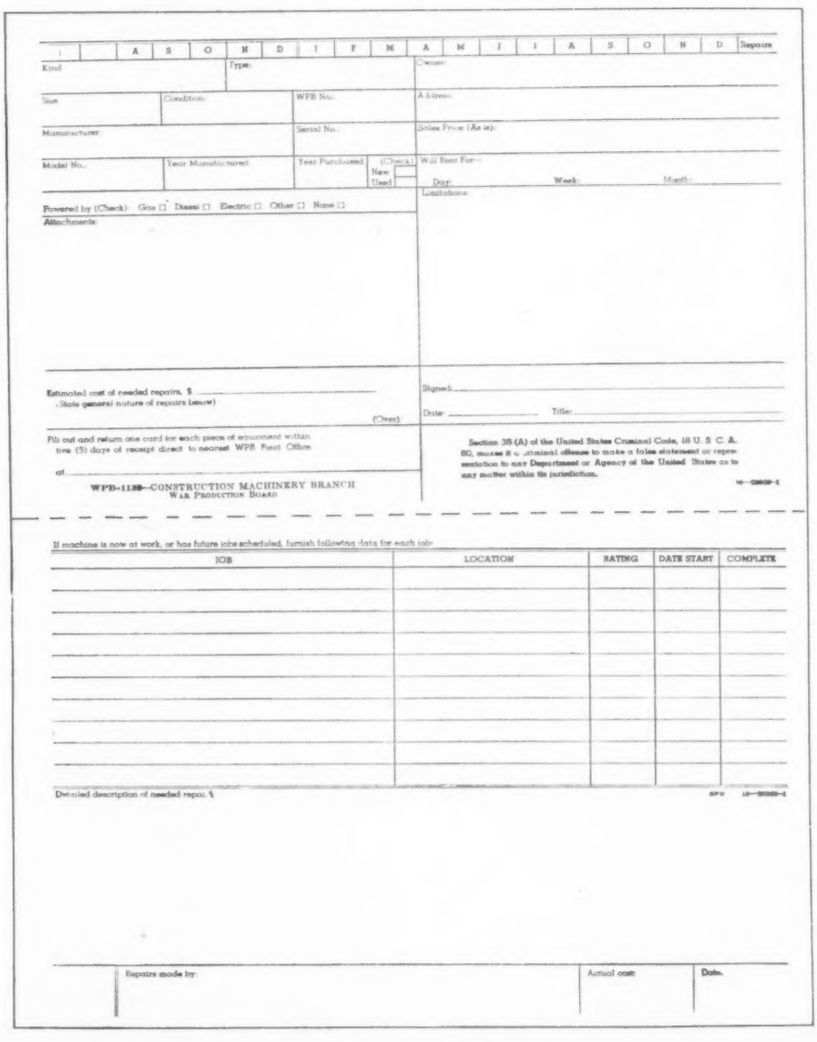
Mining Priority Status Raised

The United States mining industry was given assurance on November 16 of the highest priority assistance through the announcement by the Requirements Committee that, in cases of extreme urgency, a rating of AA-1 will be assigned for the purchase of mine maintenance and repair materials in the fourth quarter of 1942.

New mining machinery may be assigned a rating of AA-2X, where this high rating is considered necessary by WPB to secure the delivery of essential equipment.

It is pointed out that these ratings are not blanket ratings but may be applied only under the specific direction of WPB.

The amount of material to which these high ratings may be applied in no case may exceed the amount which has already been set aside for the mining industry for use in the fourth quarter of 1942.



WPB-1159—CONSTRUCTION MACHINERY BRANCH
WAR PRODUCTION BOARD

Kind | Type | Owner
Size | Condition | WPB No. | Address
Manufacturer | Serial No. | Sales Price (As is)
Model No. | Year Manufactured | Year Purchased | (Check) New Used | Will Rent For: Day: Week: Month:
Powered by (Check) Gas ☐ Diesel ☐ Electric ☐ Other ☐ None ☐
Attachments | Limitations
Estimated cost of needed repairs, $ (State general nature of repairs below) (Over)
Signed: Date: Title:
Fill out and return one card for each piece of equipment within five (5) days of receipt direct to nearest WPB Field Office at
Section 35 (A) of the United States Criminal Code, 18 U. S. C. A. 80, makes it a criminal offense to make a false statement or representation to any Department or Agency of the United States as to any matter within its jurisdiction.

If machine is now at work, or has future jobs scheduled, furnish following data for each job:

JOB	LOCATION	RATING	DATE START	COMPLETE

Detailed description of needed repairs $

Repairs made by: | Actual cost: | Date:

Form WPB-1159 for reporting inventory of construction equipment on hand.

Heaters, and circulators, tank-car.
Hoists, contractors'.
Loaders, portable bucket (other than coal).
Maintainers, road.
Maintainers, shoulder.
Mixers, bituminous cold-mix type—10-ton per hour capacity or more.
Mixers, agitator, concrete, truck type.
Mixers, concrete, truck-mounted with elevating towers.
Mixers, concrete-construction—above 10-cubic foot size.
Pavers, concrete.
Plants, stabilizing.
Plants, asphalt.
Plows, snow, V and blade type, truck-, tractor- or grader-mounted.
Plows, snow, rotary type.
Power-control units for tractors, both cable and hydraulic.
Pumps, portable engine- or electric-motor-driven pumping units mounted on skids, with or without handles, or trailer-mounted, larger than 90,000 gallons per hour self-priming centrifugal pumps, horizontal or vertical triplex piston road pumps, ordinarily used for contractors' purposes or by contractors for dewatering and supply, as defined and approved in Contractors Pumps Standards by the Associated General Contractors of America, Inc. (A. G. C.), February 21, 1941.
Rippers, road.
Rollers, road, pneumatic-tired.
Rollers, road, portable.
Rollers, tamping and sheepsfoot.
Rollers, road, tandem.
Rollers, road, 3-wheeled.
Scrapers, carrying and hauling, both drawn and self-propelled.
Screening plants, portable type.
Shovels, crawler-mounted, power.
Shovels, rubber-tire-mounted, power.
Shovels, tractor-mounted, power.
Spreaders, concrete.
Sweepers, street.
Sweepers, street, motor pick-up.
Wagons, contractors' crawler.
Washing-and-screening plants, portable type.
Winches, tractor-mounted.

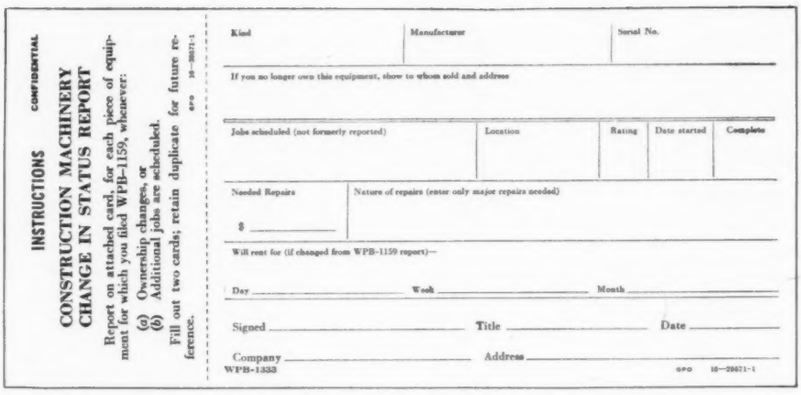
SCHEDULE B

The items of construction machinery and equipment appearing in Schedule B are subject to all the paragraphs of this order except:

1. Paragraph (d), controlling the procedure for placing and receiving orders.

2. Paragraph (j), restricting resale, rental and use of equipment.

Blade bits.
Blades, grader.
Breakers, paving.
Buckets, clam-shell.
Buckets, concrete.
Buckets, drag-line.
Buckets, orange-peel.
Buckets, scraper (bottomless) for drag-line operation.
Buggies and carts, concrete, hand-operated.
Buggies and carts, concrete, power-propelled.
Center-line markers.
Chutes, concrete-handling.
Concrete, surfacing machines.
Conveyors, construction-material.
Crushers, gyratory and cone (portable type).
Disk, road.
Distributors, water.
Ditchers, blade.
Drills, jack-hammer.
Drills, rock, except portable, mounted.
Filling machines, joint and crack.
Fine graders and subgraders, drawn type.
Finishers, floor other than wood.
Form-tamping machines.
Graders, under-truck type.
Heaters, asphalt-surface.
Heaters, concrete-mixer.
Hoppers, portable, concrete.
Jacks, mud.
Joint levellers.
Kettles, bituminous heating.
Loaders, portable snow.
Mixers, aggregate pulverizers.
Mixers, bituminous, cold-mix type, under 10-ton per hour capacity.
Mixers, concrete-construction, 10-cubic foot and smaller.
Mixers, plaster and mortar.
Paving breakers.
Plows, cable-laying.
Pumps, concrete.
Pumps, portable engine- or electric-motor-driven pumping units, mounted on skids with or without handles, or trailer mounted, 90,000 gallons per hour and smaller self-priming, centrifugal pumps, plunger pumps, or diaphragm pumps ordinarily used for contractors' purposes or by contractors for dewatering and supply as defined and approved by the Associated General Contractors of America, Inc. (A. G. C.), February 21, 1941, excluding farm type, industrial type and Underwriters approved fire fighting pumps.
Scarifiers.
Scrapers, drag, Fresno and rotary.
Screens, rotary, vibrator and gravity types, other than coal and industrial.
Sprayers, bituminous-material.



INSTRUCTIONS CONFIDENTIAL

CONSTRUCTION MACHINERY CHANGE IN STATUS REPORT

Report on attached card, for each piece of equipment for which you filed WPB-1159, whenever:
(a) Ownership changes, or
(b) Additional jobs are scheduled.
Fill out two cards; retain duplicate for future reference.

GPO 16—29671-1

Kind | Manufacturer | Serial No.

If you no longer own this equipment, show to whom sold and address

Jobs scheduled (not formerly reported) | Location | Rating | Date started | Complete

Needed Repairs | Nature of repairs (enter only major repairs needed)

$ _____

Will rent for (if changed from WPB-1159 report)—

Day _____ Week _____ Month _____

Signed _____ Title _____ Date _____

Company _____ Address _____

WPB-1333

GPO 16—29671-1

Form WPB-1333 for reporting change in status of construction machinery.

Spreaders, aggregate.
Towers, concrete-placing.
Towers, material-elevating.
Vibrators, concrete.
Winches, contractor.

SCHEDULE C

The items appearing in Schedule C may be ordered and produced only for military purposes as provided in paragraphs (d) (1) (ii) and (e) (4).

Batchers, construction-material.
Batching plants, construction type.
Bins, construction-material, portable.
Bins, construction-material, stationary.
Brooms, contractors' rotary.
Buckets, scraper (bottomless) for drag-line operation.
Buggies and carts, concrete, hand-operated.
Buggies and carts, concrete, power-propelled.
Center-line markers.
Chutes, concrete-handling.
Concrete surfacing machines.
Conveyors, construction-material—except when a part of a portable crushing plant.
Derricks, guy.
Derricks, stiff-leg.
Disk, road.
Ditchers, blade.
Dredges, and dredge equipment.
Drilling machines, core drills.
Drilling machines, portable well.
Driers, construction-aggregate, except portable type.
Filling machines, joint and crack.
Finishers, floor other than wood.
Form-tamping machines.
Graders, blade or pull type, earth-moving.
Graders, elevating, earth-moving.
Graders, self propelled, earth-moving.
Graders, under-truck type.
Grapples.
Heaters, asphalt-surface.
Hoists, contractors.
Hoppers, portable concrete.
Jacks, mud.
Joint levellers.
Maintainers, road.
Maintainers, shoulder.
Plants, asphalt except portable travel-mix type.
Plows, cable-laying.
Plows, snow, V and blade type, truck-, tractor, or grader-mounted.
Rollers, road, pneumatic-tired.
Rollers, road, tandem.
Rollers, road, 3-wheeled.
Scrapers, drag, Fresno and rotary.
Screening plants, portable type.
Sweepers, street.
Sweepers, street, motor pick-up.
Towers, concrete-placing.
Towers, material-elevating.
Washing-and-screening plants, portable type.

Increasing need for quick deliveries of urgently-required construction equipment for the armed forces both in the combat zones and in other military areas brought forth an appeal November 16 for immediate registration of all used construction machinery with regional offices of the War Production Board.

The time limit for registration of used equipment under Limitation Order L-196 expired October 31. Persons subject to the provisions for registration are required to file a completed WPB Form 1159.

The Used Construction Machinery Section, in an appeal for prompt compliance by owners, urged that those who have not as yet registered their equipment should immediately get in touch with the Construction Machinery Specialist at the nearest regional or district office of WPB.

Following is a list of these specialists showing the locations of their offices:

Atlanta, Georgia—E. J. Saxton, 1627 Candler Bldg.
Boston, Massachusetts—H. S. Swartz, 17 Court St.
Charlotte, North Carolina—W. W. Caughman, 409 Law Bldg.
Chirago, Illinois—Bob Howe, 20 N. Wacker Drive.
Cincinnati, Ohio—Robert J. Carroll, 906 Union Trust Bldg.
Dallas, Texas—J. D. Creel, 910 Fidelity Bldg.
Denver, Colorado—B. M. Burtness, 617 Kittredge Bldg.
Detroit, Michigan—W. F. Bartholomae, 800 Boulevard Bldg.
Los Angeles, California—Louis Gardella, 1031 S. Broadway.
Memphis, Tennessee—Pearl H. Miller, 1821 Sterick Bldg.
Minneapolis, Minnesota—C. W. Ellis, 326 Midland Bank Bldg.
New York, New York—George Black, 122 E. 42nd St.
Philadelphia, Pennsylvania—Fred Nelson, 1617 Pennsylvania Blvd.
Portland, Oregon—Sumner W. Williams, Bedell Bldg.
St. Louis, Missouri—Thomas Ryan, 907 Paul Brown Bldg.
San Francisco, California—Chester J. Deutsch, 1355 Market St.
Seattle, Washington—Dick Williams, White-Henry-Stuart Bldg.

R. E. Reed, Chief of the Used Construction Machinery Section, in a statement issued by that office, reminds owners of used construction machinery that L-196 also requires the submission of WPB Form 1333 (reproduced above) at any time a change of major status or location occurs on equipment listed by them with their regional office.

FLUORSPAR MAXIMUM PRICES. — An increase in maximum prices for metallurgical fluorspar, designed to stimulate production, expand facilities and encourage new producers to enter the fluorspar field, was announced November 18 by the Office of Price Administration.

This action on the part of OPA is one of a number of steps being taken by government agencies to expand fluorspar output. The price increase is judged to be an essential part of such a program because of the necessity of opening up deposits inaccessible and submarginal at present prices and because of the need for substantial exploratory and developmental expenditures on the part of present operators.

The new base ceiling prices range from $25 to $28 per short ton, according to

calcium flouride and silica content, compared with $23 to $25 for top-grade fluorspar previously. They are subject to freight adjustments.

At the same time dollar-and-cents ceiling prices are established for acid-grade fluorspar, except in the Illinois-Kentucky district. The new prices are based upon a price of $32 per short ton for material with a minimum calcium-fluoride content of 97½ per cent. and a maximum silica content of 1½ per cent., but are subject to freight adjustments. The resulting f. o. b. mine prices are in line with the level of maximum prices heretofore established individually for each producer.

Metallurgical fluorspar is used as a flux in the production of steel. The acid-grade commodity is a material from which hydrofluoric acid is made. Hydrofluoric acid, in turn, goes into the manufacture of synthetic cryolite, important as a flux in the production of aluminum.

The new prices are established in Maximum Price Regulation No. 126, as amended (Fluorspar), and became effective November 23, 1942.

"A critical shortage exists in the supply of metallurgical grades of fluorspar, and it is imperative that steps be taken to increase its production," OPA said. "The new maximum prices for the lowest grade of metallurgical fluorspar are now being set at the highest previous prices for the standard grade of metallurgical fluorspar."

It is expected the higher prices will allow increased production, not only by enabling producers to undertake the developmental work required to develop reserves and to allow the production of ore already proved, but also by encouraging prospective producers to enter the industry and present producers to expand their production.

In recognition of substantial variations in cost in an industry in which increased output is imperative, the revised regulation contains a new provision through which OPA may adjust any producer's maximum prices upward by an amount necessary to insure the maintenance or expansion of his production with a reasonable operating margin.

There are two principal fluorspar areas in the United States. They are known as the Illinois-Kentucky area, made up of Illinois and Kentucky, and the "Western area," comprising producing states west of the Mississippi River. The principal "Western area" States are Colorado, Nevada, New Mexico, Utah and Montana.

The new maximum prices for acid-grade ore are not applicable to the Illinois-Kentucky area, where previous ceilings, varying for the producer, remain in effect.

PARTS OF AUTOMOTIVE VEHICLES.— Hoists, cranes, winches, tanks, bodies, etc. used on automotive equipment are considered "parts" for the purpose of General Order ODT No. 21, Jack Garrett Scott, general counsel of the Office of Defense Transportation, said in an interpretation issued October 20.

Under the provisions of Order No. 21, no person may purchase, or have installed or mounted upon a commercial motor vehicle any "part" after November 15, 1942, without having a Certificate of War Necessity for the vehicle on which the part is to be installed or mounted.

The order is equally binding upon the person who "transfers, mounts, installs or delivers" the part and requires him to see that the purchaser of the part presents a valid Certificate for the vehicle for which the part is intended.

RENEGOTIATION OF WAR CONTRACTS.— Important changes in the law relating to the authority of the War and Navy Departments and the United States Maritime Commission to renegotiate war contracts in order to eliminate excessive or exorbitant profits are contained in the Revenue Act of 1942, signed by the President on October 21.

These changes were enacted as amendments to Section 403 of the Sixth National Defense Appropriation Act and clarify procedures under which renegotiation is proceeding.

Some of the amendments represent a codification of practices which the Price Adjustment Boards of the three services have been following in recent months. Others are of a basic nature, intended to clarify practices and speed renegotiation.

The amendments are:

(1) *Renegotiation of Treasury Contracts.* Contracts with the Treasury Department, which makes many of the lend-lease contracts and subcontracts thereunder, also are made subject to renegotiation.

(2) *Final Agreements.* When a contractor or subcontractor has renegotiated in good faith for a specified period and agreed to eliminate excessive profits for such period, he is entitled to assurance that the matter will not be reopened at a later date. The statute did not provide expressly for any final clearance for liability for excessive profits. Amendments now specifically authorize such final agreements for a specified past or future period.

(3) *Statute of Limitations.* Two provisions effect a statute of limitations on renegotiation. One prohibits renegotiation after one year from the close of the fiscal year in which the contract or subcontract was completed or terminated. The other authorizes a contractor to file financial and cost statements for a prior fiscal period and obtain clearance under the statute unless the Secretary begins renegotiation within one year thereafter.

(4) *Over-all Renegotiation.* Under the original law when a contractor or subcontractor held a number of war contracts or subcontracts, the boards had found it desirable to renegotiate with him to eliminate excessive profits on these contracts or subcontracts as a group, or on an over-all basis instead of individually. Section 403 authorized renegotiation of contracts individually. In view of the boards' practice of considering contracts as a group, the group renegotiation has been formalized as part of the statute. Excessive profits are determined by an over-all study of a company's financial position and the profits, past and prospective, from its contracts are taken as a whole rather than by analyzing each individual contract on a unit cost basis. The statute does not confer any authority of renegotiation with respect to profits on contracts other than war contracts and all commercial or non-war profits are segregated and no renegotiation with respect thereto takes place. The statute provides that a renegotiation clause shall be inserted in every war contract of $100,000 or more.

(5) *Eliminating Excessive Profits.* With respect to prospective profits it always was desirable to eliminate such profits by reductions in contract price or by revision in the contract terms instead of by recapture or refund. An amendment clarifies these provisions and permits any combination of these methods to be used.

Some subcontractors expressed concern that even though the price reduction is made as agreed, the subcontractor still might be liable for the excessive profit if for any reason the government failed to receive the benefit. While, the War, Navy and Maritime Commission Price Adjustment Boards did not place such an interpretation on this part of the statute, the possibility was removed.

(6) *Offset.* The statute made no express provision for offsetting taxes paid by a contractor against any amount of excessive profits found to exist by renegotiation under the statute. In the absence of such offset the contractor might have been forced to pay twice, once in the form of taxes and second, by refund of excessive profits. The statute is now amended, allowing credit for Federal income and excess profits taxes paid or payable on the profits being refunded.

(7) *Exemptions from Renegotiation.* The law provides for certain statutory exemptions as follows:

(a) The statute is amended permitting the Secretaries of the War, Navy and Treasury Departments and the Chairman of the Maritime Commission to exempt from renegotiation contracts or subcontracts at firm prices for specific periods if in their opinions the provisions of the contract or subcontract are otherwise adequate to prevent excessive profits.

(b) Also exempted from renegotiation are prime contracts and subcontracts made with other federal or local governmental agencies or a foreign government.

(c) The Secretaries of War, Navy and Treasury and the Maritime Commission are authorized to exempt contracts from renegotiation when the profit can be determined with reasonable certainty when the original price is agreed upon, such as those for personal services, for the purchase of real estate or perishable goods or for commodities at a minimum price fixed by a regulatory body and contracts to be performed in a short period.

(d) Any contract or subcontract for the product of a mine, oil or gas well, or other mineral or natural deposit, or timber, which has not been processed, refined, or treated beyond the first form or state suitable for industrial use is exempted from the operation of the statute; and the secretaries are authorized by joint regulation, to define, interpret, and apply this exemption.

(e) Contractors and subcontractors whose aggregate sales for war purposes are less than $100,000 in a fiscal year are exempted.

Other Changes. The following clarifying changes have been made in the statute:

(a) Excessive profits may be eliminated through a reduction in the contract price or otherwise as the Secretaries of War, Navy and Treasury and the Chairman of the Maritime Commission may direct.

(b) A contractor or subcontractor may be required to refund excessive profits only if they have actually been paid to him.

(c) The Secretaries may fix a period or periods for renegotiation in the contract.

(d) A contractor is liable for reductions in the subcontract price only if he receives the benefit of the reduction.

(e) The Secretaries of War, Navy and Treasury and the Chairman of the Maritime Commission are required to recognize the properly applicable exclusions and deductions of the character allowed under Chapters 1 and 2 E of the Internal Revenue Code.

TRANSPORTATION TAX CAN'T BE PASSED ON.— The 3-per cent. property transportation tax imposed under the 1942 revenue act, effective December 1, must be considered as a freight-rate increase which *can not* be passed on, rather than as a tax which can, the Office of Price Administration ruled November 22.

This decision will be contained in a supplementary order to be issued within a few days. The ruling means that the seller will absorb the new tax under some pricing systems and the buyer under others. Where the pricing is on a "delivered-price" basis, for example, the seller will absorb the tax. In cases where the price is "f.o.b. producer's establishment," on the other hand, the buyer will absorb the cost. The rule holds throughout all variants of these two.

The supplementary order will apply to all maximum price regulations *except*:

Revised Price Schedule No. 4—Iron and Steel Scrap; Maximum Price Regulation No. 130—Standard Newsprint Paper; Revised Maximum Price Regulation No. 148—Dressed Hogs and Wholesale Pork Cuts; Maximum Price Regulation No. 236—Heating Boiler Conversion Parts; Maximum Price Regulations Nos. 112, 120, 121, 122 and 189, all dealing with coal.

The 1942 Revenue Act provides a tax of 4 cents a ton on the transportation of coal. OPA action on how this tax shall be treated in arriving at maximum prices is expected in the near future. Similarly, action is expected on iron and steel scrap, which is priced on a basing-point system,

and on the other products exempted for various reasons from the supplementary order.

TRUCK-MILEAGE RATIONING.—Effective date of the Office of Defense Transportation's mileage rationing program for commercial motor vehicles was postponed November 12 from November 15 to December 1.

Joseph B. Eastman, Director of Defense Transportation, pointed out that the 15-day postponement would correlate the ODT program with the Office of Price Administration's mileage rationing program for private passenger automobiles, the start of which had been postponed from November 22 to December 1.

After December 1 no commercial motor vehicle subject to General Order ODT No. 21 will be permitted to operate unless it carries a Certificate of War Necessity issued by the ODT. Several days are required to process the certificates and get them back to the operators. In the event an application is not properly filled out or the wrong application is submitted, even more time will be required.

Postponement of the Certificates of War Necessity deadline does not change the period in which the tires of all commercial motor vehicles must be inspected, ODT officials emphasized. These inspections must be completed before January 15. Following the initial inspection, the tires of every truck, bus, taxicab or other commercial motor vehicle must be taken in for inspection every 5,000 miles or 60 days, whichever is completed first. After such inspection no commercial motor vehicle will be permitted to operate unless the official tire inspector has certified that all possible and necessary repairs, replacements or adjustments to assure maximum conservation of tires have been made.

A provision for granting temporary transport rations to trucks, buses, taxis and other commercial vehicles for which Office of Defense Transportation Certificates of War Necessity have not been issued was announced November 23 by the Office of Price Administration.

The provision is included in Amendment No. 1 to the new nation-wide gasoline rationing regulations and was effective November 21.

Beginning November 23 commercial vehicle operators who have applied to the Office of Defense Transportation for, but have not received, Certificates of War Necessity may apply at their local War Price and Rationing Boards for temporary transport rations to be valid beginning December 1. Applicants may receive T rations, on this temporary basis, for the amount of gasoline they estimate they will require through December 31.

Any gallonage provided through a temporary ration will later be deducted from the gallonage allowed by the Office of Defense Transportation on the Certificate of War Necessity.

Through an agreement with OPA and ODT temporary transport rations also will be granted to operators of commercial motor vehicles whose Certificates of War Necessity contain clerical or other errors obvious on the face of the certificate.

The ODT has announced that the holder of a temporary ration or any holder of an ODT certificate who is dissatisfied with the amount of gasoline that has been allowed him may apply to his ODT district office for a revised certificate.

The OPA amendment also made official the postponement of nation-wide mileage rationing from November 22 to December 1. Beginning December 1 it will be illegal to operate a passenger car for which the owner has more than five tires.

VEHICLES EXEMPTED FROM ODT 21.—Certain types of industrial, construction, maintenance and farm equipment have been exempted from General Order ODT No. 21, under which commercial motor vehicles will be required to carry Certificates of War Necessity after December 1, Joseph B. Eastman, Director of the Office of Defense Transportation, announced October 24.

Exemption Order ODT No. 21-1, providing the only general exemption issued under General Order ODT No. 21, lists the vehicles which will not be required to have Certificates.

TITLE 49—TRANSPORTATION AND RAILROADS
CHAPTER II—OFFICE OF DEFENSE TRANSPORTATION
(EXEMPTION ORDER ODT 21-1)

PART 521—CONSERVATION OF MOTOR EQUIPMENT—EXCEPTIONS, PERMITS, AND EXEMPTIONS

SUBPART M—CERTIFICATES OF WAR NECESSITY SPECIAL INDUSTRIAL, CONSTRUCTION AND MAINTENANCE VEHICLES: FARM MACHINES: TRAILERS: MOTORCYCLES AND MOTOR SCOOTERS

By virtue of the authority vested in me by Executive Order No. 8989, dated December 18, 1941, and by Executive Order 9156, dated May 2, 1942:

It Is Hereby Ordered, that:

Sec. 521.3500. *Partial Exemption of Special Industrial, Construction, and Maintenance Vehicles, Farm Machines, Certain Trailers, and Motorcycles and Motor Scooters Available for Public Rental.* Industrial motor vehicles equipped with solid rubber tires or pneumatic tires, not designed for use on the highways, and used within industrial plants, warehouses, docks and terminals for intraplant movement of property; motor graders, scrapers, scoops, bulldozers, and other similar vehicles equipped with solid rubber tires or pneumatic tires and used in construction or maintenance work; planters, broadcast seeders, fertilizer distributors, sprayers and other similar machines equipped with solid rubber tires or pneumatic tires and used in farming operations; farm trailers and semi-trailers, and other trailers and semi-trailers equipped with solid rubber tires or pneumatic tires, regularly drawn or powered by private passenger automobiles; and motorcycles and motor scooters available for public rental, are hereby exempted from the provisions of Subpart M, (General Order ODT 21[1]) Part 501, this chapter and title of the Code of Federal Regulations, except §501.101.

This Executive Order (§521.3500) shall become effective on November 15, 1942, and shall remain in full force and effect until further order.

Issued at Washington, D. C., this 22nd day of October, 1942.

JOSEPH B. EASTMAN,
Director of Defense Transportation.

[1] 7 F. R. 7100.

WAGES STABILIZED.—The following is the text of the wage-and-salary stabilization order issued by Economic Stabilization Director James F. Byrnes and approved by President Roosevelt on October 27.

TITLE 32—NATIONAL DEFENSE
CHAPTER XVIII—OFFICE OF ECONOMIC STABILIZATION
SUBCHAPTER A—OFFICE OF THE DIRECTOR OF ECONOMIC STABILIZATION

PART 4001—WAGES AND SALARIES

By virtue of the authority vested in the President by the Constitution and the laws of the United States, and particularly by the Act of October 2, 1942, entitled "An act to amend the Emergency Price Control Act of 1942, to aid in preventing inflation, and for other purposes" (Public No. 729, 77th Congress, 2d Session), the following regulations are hereby promulgated.

Definitions

Sec. 4001.1. *Definitions.*—When used in these regulations, unless otherwise distinctly expressed or manifestly incompatible with the intent thereof—

(a) The term "Act" means the Act of October 2, 1942 (Public No. 729, 77th Congress), entitled "An act to amend the Emergency Price Control Act of 1942, to aid in preventing inflation, and for other purposes."

(b) The term "Board" means the National War Labor Board created by Executive Order No. 9017, dated January 12, 1942 (7 F.R. 237).

(c) The term "Commissioner" means the Commissioner of Internal Revenue.

(d) The term "Code" means the Internal Revenue Code, as amended and supplemented.

(e) The term "salary" or "salary payments" means all forms of direct or indirect compensation which is computed on a weekly, monthly, annual or other comparable basis, except a wage basis, for personal services of an employee irrespective of when rendered, including bonuses, additional compensation, gifts, loans, commissions, fees, and any other remuneration in any form or medium whatsover (excluding insurance and pension benefits in a reasonable amount).

(f) The term "salary rate" means the rate or other basis at which the salary for any particular work or service in computed either under the terms of a contract or agreement or in conformity with an established custom or usage.

(g) The term "wages" or "wage payments" means all forms of direct or indirect compensation which is computed on an hourly or daily basis a piece-work basis, or other comparable basis, for personal services of an employee, irrespective of when rendered, including bonuses, additional compensation, gifts, commissions, loans, fees, and any other remuneration in any form or medium whatsoever (but excluding insurance and pension benefits in a reasonable amount).

(h) The term "insurance and pension benefits in a reasonable amount" means

(1) contributions by an employer to an employees' trust or under an annuity plan which meets the requirements of section 165(a) of the Code, and

(2) amounts paid by an employer on account of premiums on insurance on the life of the employee which amounts are deductible by the employer under section 23(a) of the Code, except that if such amounts are includible in the gross income of the employee under the Code, the amount in respect of each employee may not exceed five per cent. of the employee's annual salary or wages determined without the inclusion of insurance and pension benefits.

(i) The terms "approval by the Board" and "determination by the Board" shall, except as may be otherwise provided in the regulations or orders of the Board, include an approval or determination by an agent of the Board duly authorized to perform such act; and such approval or determination, if subsequently modified or reversed by the Board, shall nevertheless for the purpose of these regulations, be deemed to have been continuously in effect from its original date until the first day of the payroll period immediately following the reversal or modification or until such later date as the Board may direct.

(j) The terms "approval by the Commissioner" and "determination by the Commissioner" shall, except as may be otherwise provided in regulations prescribed by the Commissioner, include an approval or determination by an agent of the Commissioner duly authorized to perform such act; and such approval or determination, if subsequently modified or reversed by the Commissioner, shall nevertheless for the purpose of these regulations, be deemed to have been continuously in effect from its original date until the first day of the payroll period immediately following reversal or modification or until such later date as the Commissioner may direct.

Authority of Board

Sec. 4001.2. *Authority of National War Labor Board*—The Board shall, subject to the provisions of sections 1, 2, 3, 4, 8, and 9 of Title II of Executive Order No. 9250, of October 3, 1942, have authority to determine whether any—

(a) Wage payments, or

(b) Salary payments to an employee totaling in amount not in excess of $5,000 per annum where such employee

(1) in his relations with his employer is represented by a duly recognized or certified labor organization, or

(2) is not employed in a *bona fide* executive, administrative or professional capacity are made in contravention of the act, or any rulings, orders or regulations promulgated thereunder. Any such determination by the Board, made under rulings and order issued by it, that a payment is in contravention of the Act, or any rulings, orders, or regulation promulgated thereunder, shall be conclusive upon all Executive Departments and agencies of the Government in determining the costs or expenses of any employer for the purpose of any law or regulation either heretofore or hereafter enacted or promulgated, including the Emergency Price Control Act of 1942 or any maximum

price regulation thereof, or for the purpose of calculating deductions under the revenue laws of the United States, or for the purpose of determining costs or expenses under any contract made by or on behalf of the United States. Any determination of the Board made pursuant to the authority conferred on it shall be final and shall not be subject to review by The Tax Court of the United States or by any court in any civil proceedings.

Rules of Board

Sec. 4001.3. *Rules Orders and Regulations of Board.*—The Board may make such rulings and issue such orders or regulations as it deems necessary to enforce and otherwise carry out the provisions of these regulations.

Sec. 4001.4. *Authority of the Commissioner of Internal Revenue.*—The Commissioner shall have authority to determine, under regulations to be prescribed by him with the approval of the Secretary of the Treasury, whether any salary payments other than those specified in paragraph (b) of section 4001.2 of these regulations are made in contravention of the Act, or any regulations or rulings promulgated thereunder. Any such determination by the Commissioner, made under such regulations, that a payment is in contravention of the Act, or any rulings or regulations promulgated thereunder, shall be conclusive upon all Executive Departments and agencies of the Government in determining the costs or expenses of any employer for the purpose of any law or regulations, either heretofore or hereafter enacted or promulgated, including the Emergency Price Control Act of 1942 or any maximum price regulation thereof, or for the purpose of calculating deductions under the revenue laws of the United States, or for the purpose of determining costs or expenses under any contract made by or on behalf of the United States. Any determination of the Commissioner made pursuant to the authority conferred on him shall be final and shall not be subject to review by The Tax Court of the United States or by any court in any civil proceedings. No increase in a salary rate approved by the Commissioner shall result in any substantial increase of the level of costs or shall furnish the basis either to increase price ceilings of the commodity or service involved or to resist otherwise justifiable reductions in such price ceilings.

Sec. 4001.5. *Rules and Regulations of Commissioner.*—The Commissioner may prescribe such regulations with the approval of the Secretary of the Treasury, and make such rulings as he deems necessary, to enforce and otherwise carry out the provisions of these regulations.

Salary Increases

Sec. 4001.6. *Salary Increases.*—In the case of a salary rate of $5,000 or less per annum existing on the date of the approval of these regulations by the President and in the case of a salary rate of $5,000 or less per annum existing on October 3, 1942, no increase shall be made by the employer except as provided in regulation, rulings, or orders promulgated under the authority of these regulations. Except as herein provided, any increase made after such respective dates shall be considered in contravention of the Act and the regulations, rulings, or orders promulgated thereunder from the date of the payment if such increase is made prior to the approval of the Board or the Commissioner, as the case may be.

In the case, however, of an increase made in accordance with the terms of a salary agreement or salary rate schedule and as a result of

(a) individual promotions or reclassifications,

(b) individual merit increases within established salary rate ranges,

(c) operation of an established plan of salary increases based on length of service,

(d) increased productivity under incentive plans,

(e) operation of a trainee system, or

(f) such other reasons or circumstances as may be prescribed in orders, rulings, or regulations, promulgated under the authority of these regulations,

no prior approval of the Board or the Commissioner is required. No such increase shall result in any substantial increase of the level of costs or shall furnish the basis either to service involved or to resist otherwise justifiable reductions in such price ceilings.

Salary Decreases

Sec. 4001.7. *Decreasers in salaries of less than* $5,000.—In the case of a salary rate existing as of the close of October 3, 1942, under which an employee is paid a salary of less than $5,000 per annum for any particular work, no decrease shall be made by the employer below the highest salary rate paid for such work between January 1, 1942, and September 15, 1942, unless to correct gross inequities or to aid in the effective prosecution of the war. Any decrease in such salary rate after October 3, 1942, shall be considered in contravention of the Act and the regulations, rulings, or orders promulgated thereunder if such decrease is made prior to the approval of the Board or the Commissioner, as the case may be.

Sec. 4001.8. *Decreases in salaries of over* $5,000.—In the case of a salary rate existing as of the close of October 3, 1942, under which an employee is paid a salary of $5,000 or more per annum, no decrease in such rate made by the employer shall be considered in contravention of the Act and the regulations promulgated thereunder (see section 5 (b) of the Act); provided, however, that if by virtue of such decrease the new salary paid to the employee is less than $5,000 per annum, then the validity of such decrease below $5,000 shall be determined under the provisions of section 4001.7 of these regulations.

Salary Limitation

Sec. 4001.9. *Limitation on Certain Salaries.*—(a) No amount of salary (exclusive of any amounts allowable under paragraphs (b) and (c) of this section) shall be paid or authorized to be paid to or accrued to the account of any employee or received by him during the taxable year which, after reduction by the Federal income taxes on the amount of such salary, would exceed $25,000. The amount of such Federal income taxes shall be determined (1) by applying to the total amount of salary (exclusive of any amounts allowable under paragraphs (b) and (c) of this section) paid or accrued during the taxable year, undiminished by any deductions, the rates of taxes imposed by Chapter 1 of the Code (not including section 466) as if such amount of salary were the net income (after the allowance of credits applicable thereto), the surtax net income, and the Victory tax net income, respectively, and (2) without allowance of any credits against any of such taxes.

(b) In any case in which an employee establishes that his income from all sources is insufficient to meet payments customarily made to charitable, educational or other organizations described in section 23 (o) of the Code, without resulting in undue hardship, then an additional amount sufficient to meet such payments may be paid or authorized to be paid to or accrued to the account of any employee or received by him during the taxable year even though it exceeds the amount otherwise computed under paragraph (a).

(c) In any case in which an employee establishes that, after resorting to his income from all sources, he is unable, without disposing of assets at a substantial financial loss resulting in undue hardship, to meet payments for the following:

(1) Required payments (excluding accelerated payments) by the employee during the taxable year on any life insurance policies on his life which were in force on October 3, 1942,

(2) Required payments (excluding accelerated payments) made by the employee during the taxable year on any fixed obligations for which he was obligated on October 3, 1942,

(3) Federal income taxes of the employee for prior taxable years which are paid during the taxable year, not including Federal income taxes on the allowance under paragraph (a) for any prior year, an additional amount sufficient to meet such payments may be paid or authorized to be paid to or accrued to the account of any employee or received by him during the taxable year, even though it exceeds the amount otherwise computed under paragraph (a).

(d) In the case of an individual who is an employee of more than one person, the aggregate of the salaries received by such individual shall, under such circumstances as may be set forth in regulations promulgated under the authority of these regulations, be treated as if paid by a single employer.

(e) No amount of salary shall be paid or authorized to be paid to or accrued to the account of any employee or received by him after the date of approval of these regulations by the President and before January 1, 1943, if the total salary paid, authorized, accrued or received for the calendar year 1942 exceeds the amount of salary which would otherwise be allowable under paragraph (a) of this section and also exceeds the total salary paid, authorized, accrued or received for the calendar year 1941.

(f) Except as provided in paragraph (e) of this section, the provisions of this section shall be applicable to salary paid or accrued after December 31, 1942, regardless of when authorized and regardless of any contract or agreement made before or after such date.

Effect of Unlawful Payments

Sec. 4001.10. *Effect of unlawful payments.*—(a) If any wage or salary payment is made in contravention of the Act or the regulations, rulings or orders promulgated thereunder, as determined by the Board or the Commissioner, as the case may be, the entire amount of such payment shall be disregarded by the Executive Departments and all other agencies of the Government in determining the costs or expenses of any employer for the purpose of any law or regulation, including the Emergency Price Control Act of 1942, or any maximum price regulation thereof, or for the purpose of calculating deductions under the revenue laws of the United States, or for the purpose of determining costs or expenses of any contract made by or on behalf of the United States. The term "law or regulations" as used herein includes any law or regulation hereafter enacted or promulgated. In the case of wages or salaries decreased in contravention of the Act or regulations, rulings or orders promulgated thereunder, the amount to be disregarded is the amount of the wage or salary paid or accrued. In the case of wages or salaries increased in contravention of the Act or regulations, rulings or orders promulgated thereunder, the amount to be disregarded is the amount of the wage or salary paid or accrued and not merely an amount representing an increase in such wage or salary. In the case of a salary in excess of the amount allowable under section 4001.9 of these regulations which is paid or accrued to an employee during his taxable year in contravention of the Act or regulations, rulings or orders promulgated thereunder, the amount to be disregarded is the full amount of such salary and not merely the amount representing the excess over the amount allowable under such section 4001.9.

(b) Payments made or received in violation of any regulations, rulings or orders promulgated under the authority of the Act are subject to the penal provisions of the Act.

Exempt Employers

Sec. 4001.11. *Exempt employers.*—The provisions of sections 4001.6, 4001.7 and 4001.8 of these regulations shall apply only in the case of an employer who employs more than eight individuals.

Other Provisions

Sec. 4001.12. *Salary Allowances under Internal Revenue Code.*—No provision of these regulations shall preclude the Commissioner from disallowing as a deduction in computing Federal income tax any compensation paid by an employer (regardless of the number of employees and of the amount paid to any employee) in excess of a "reasonable allowance" in accordance with the provisions of section 23 (a) of the Code.

Sec. 4001.13. *Statutory Salaries and Wages.*—These regulations shall be applicable to any salary or wages paid by the United States, any State, Territory or possession, or political subdivision thereof, the District of Columbia, or any agency or instrumentality of any one or more of the foregoing, except where the amount of such salary or wages is fixed by statute.

Sec. 4001.14. *Territories and Possessions.*—The Board and the Commissioner shall have the authority to exempt from the operation of these regulations any wages or salaries paid in any Territory or possession of the United States where deemed necessary for the effective administration of the Act and these regulations.

Sec. 4001.15. *Regulations of Economic Stabilization Director.*—The Director shall have authority to issue such regulations as he deems necessary to amend or modify these regulations.

Sec. 4001.16. *Effect of Executive Order No. 9250.*—To the extent that the provisions of Executive Order No. 9250, dated October 3, 1942 (7 F.R. 7871), are inconsistent with these regulations, such provisions are hereby superseded.

JAMES F. BYRNES,
Economic Stabilization Director.

Approved:
FRANKLIN D. ROOSEVELT
The White House, October 27, 1942.

V-221-10/27 Drawn for Office of War Information

EDITORIAL

When the War Ends

"BUT, what will happen when the war ends?" is the question one hears with increasing frequency. It is asked by business men, by workers, by professional people, by politicians, by people belonging to all economic and social groups. It is too common and too important a question to be dismissed with a blindly optimistic "Oh, everything will be all right," on the one hand, or a despairing "God only knows; I can't see anything but chaos ahead," on the other. These are the customary extremes, somewhere between which lies the truth.

To the business man in our industries, particularly those in the aggregates and cement branches, the future seems to depend largely on what the government will do. This is due not to the increasing dependence of business on government action, which many people believe to be the inevitable consequence of what they call "our rapidly-growing paternalism," but to the perhaps unpleasant, but no less inescapable, fact that the output of these industries will for a number of years following the end of the war go very largely into forms of construction financed or directed by federal, state and local governments. It is difficult to believe that the federal government, in whosever hands its control may be entrusted on the day when peace is declared, will play politics or otherwise postpone the provision of an economic cushion of some sort for the vast numbers of men discharged from the military forces when that day comes. Opinion seems to have already been fairly well crystallized into the belief that this cushion will be provided principally by the construction of public works of peace-time as well as possible future war-time value to the nation.

By the time this war ends there will have been built up in this country a huge amount of deferred construction and deferred maintenance, and the longer the war continues the larger will that "backlog" become. Private residential construction is practically at a standstill, while the raw and finished materials that would normally flow into that channel are diverted to more important types of construction. Industrial construction is limited to those forms that contribute to the winning of the war. It is not reasonable to expect that these forms of construction alone will provide the employment opportunities needed to absorb a horde of returned fighters. Dependence will naturally fall on public construction—highways, of which the future peace-time transportation needs of the nation will require "more and better"; housing, the national needs for which have been little more than sensed; urban transportation facilities, which in many places in normal times fall far short of the loads placed on them; public services, such as the provision of sanitation, light, power, and the like for the millions to whom they are still unattainable luxuries.

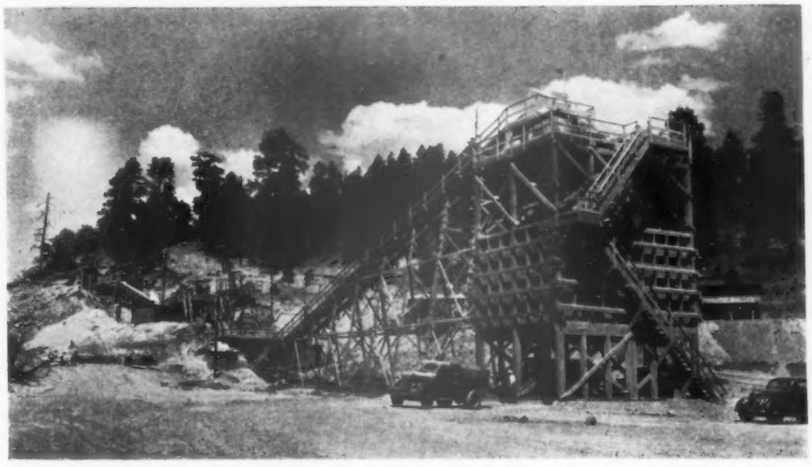
The industries that produce the raw materials of construction are destined to play, after the war a role that will be fully as important in a national sense as the part they are playing in achieving victory. They will be busily occupied supplying the only economically sound medium for preventing economic chaos after the ending of hostilities, and they will occupy the same basic position in the national economy that they occupy to-day. They will still be the source of supply for construction activity which, of all proposed forms of insurance against economic collapse, offers the only practical and certain relief from widespread unemployment and despair.

Here and there, as the production goals of the Army, Navy and other war arms of the nation are being reached, there are orders to stop the output of certain materials for certain purposes. These instances may be expected to grow in number as we approach closer toward the attainment of those goals in a national sense. No one should expect that the high levels reached in the production of materials for military construction will continue indefinitely or at an unabated pace during the war. Producers who have experienced their share of the tremendous upturn caused by the war —a surge that carried their outputs and profits to previously unheard-of levels—will not reasonably complain if and when the demand for their materials recedes from the maxima that have kept their plants working in many cases three shifts a day and seven days a week. But some of them will wonder what will keep them active between the beginning of this tapering-off and the post-war resumption of peace-time living.

DATA so far made available indicate that the total output of the nonmetallic-mineral industries as a whole—and not only those branches which provide the raw materials of construction—was approximately 38 per cent. larger in 1941 than in 1940. Scattered reports from producers in all sections of the country indicate in general that the output this year will be close to one-fourth greater than it was last year. In 1943, when the tapering-off in military needs will be more widely evident, these industries' output will probably not greatly exceed the 1940 level, and may even fall somewhat below it. For the first three, four or, possibly, five years following the close of the war, depending on how long hostilies continue, the demand for the products of these industries should be approximately of the order of magnitude of the average annual output of the 1937-1939 period.

Most producers would agree that such a level would provide an adequate production basis for satisfactory earnings, and this much appears to be a reasonable expectation. To raise these estimates, as some persons have done, seems to us unjustified by existing conditions and foreseeable future events. At no time have any of us been able to see far into the future. Certainly in war-time we have no reason to expect that our vision should be any better, or that the future should appear in any clearer light or sharper outlines. The days to come will probably reveal, what none of us can too clearly perceive or confidently believe now, that the opportunities for "good" business will be no worse on the whole than those to which we have become accustomed in recent years.

Three Producers "Pool" Equipment to Supply Ammunition-Depot Aggregate



A general view of the plant with three crusher buildings in background.

● It has often been said that the only way this war can be won is for each piece of productive machinery to be kept in operation. Aggregates producers are doing their part in providing the materials for the construction of vital plants and bases. This article tells how three producers, none of whom alone had enough equipment available, pooled what they had to build this plant to supply materials for a western ammunition depot.

THE crushed stone, sand producing and ready-mixed-concrete batching plants of Joint Ventures, Inc., which are supplying the materials for the construction of the Bellemont Project, an ammunition-storage base near Flagstaff, Arizona, are outstanding examples of the extent to which producers of these materials are coöperating to help get our war program under way as quickly as possible. These plants, as the name implies, are a joint venture of three leading Los Angeles producers who had so many other jobs in progress when this contract was let that not one of them had the equipment on hand to handle the job alone. In order to prevent delay in the construction of this vital project, therefore, they pooled their resources and took the sub-contract for the production of nearly 200,000 cubic yards of sand and stone and the mixing of the concrete and its delivery to the job. The general contractor is the Atkinson-Kier Company.

The three producers coöperating in this venture are the Blue Diamond Corporation, the Consolidated Rock Products Corporation, and Graham Brothers, Inc. All have had long experience in the production of aggregates and concrete and have handled many southern California jobs which involved the production of these materials from temporary plants. Since our war-construction program got under way they have gone much farther afield. As an example, one of these companies recently completed a ready-mixed-concrete contract at an army cantonment in southern Oregon. A few weeks after this job was finished the same batching plant was in operation near Denver supplying concrete for a huge ordnance plant.

Only minor items of the equipment used in these Joint Ventures plants was bought new for this job. Most of it came from some of the three companies' permanent plants which are not in areas where the demand requires operation at full capacity. No time was lost in assembling this equipment, and the production of aggregates was begun on June 22. It is expected that this contract will be completed in November, but the plants will probably be operated intermittently for several more months to supply the concrete for highways, bridges and other work which will complete this project.

The Bellemont Project is located 10 miles west of Flagstaff and the crushed-stone plant is 6 miles west of it. The sand plant is 20 miles northeast of Flagstaff and 30 miles from the project. As both plants and the project are near main paved highways and only the project is near a railroad, truck haulage is used. The truck fleet used is made up of machines which could be spared by these companies from their other operations.

Good rock deposits are scarce in this section, which is noted chiefly for its scenic wonders. Within easy driving distance of Flagstaff, for example, are such famous sights as the

Portable Diesel-driven compressor which supplies air for the drills.

Loading shovel, truck and bulldozer at work in the quarry.

Grand Canyon, the Petrified Forest, the Painted Desert, and many others. The deposit finally selected is what is known locally as blue malpais. This is a word common in the southwestern part of the United States and means "bad country." It is also applied to the underlying basaltic lava, but is not a fair description of the rock as the Indians were familiar only with outcroppings which had broken down after countless years of exposure to the severe weather conditions which prevail there. The altitude is over 7,000 feet, and freezes may be expected from late September until early in June. Temperatures drop under 20 degrees below

The two 3-deck sizing screens.

zero F. at times and heavy snowfalls are common. When the stone has not been exposed to the weather it is a sound aggregate and passes any reasonable tests.

The quarry is being worked into a hillside deposit from which only the trees and undergrowth are removed. The overburden is light and there are some mud seams in the deposit but no attempt is made to remove these as all the material under ¼-inch in size is wasted at the plant.

The deposit is badly seamed and broken and as a result is very difficut to drill and blast. The blast holes are drilled by two wagon-drills—a Worthington and an Ingersoll-Rand. Usually about 100 holes are drilled in three rows for the full height of the face, which is about 30 feet. As the quarry is worked farther back into the hill the height of the face will increase and shooting will be done in benches. Because of the conditions described Atlas Flo-Dyn No. 4 bag powder is used in the holes and this brings down about 1 cubic yard of rock per pound of explosive. Atlas 40-per cent gelatine explosive is used for secondary shooting. Air for the drills is supplied by a Gardner-Denver 7½- and 5¾- by 5-inch radial compressor which is mounted on a Caterpillar Diesel 75 tractor.

The two secondary gyratory crushers.

The stone is loaded into trucks by two Northwest shovels—a Number 70 and a Number 80. The latter is used most of the time and is powered by a Murphy Diesel engine. Cleaning up in the quarry, road maintenance and similar work about the plant are done by a Caterpillar RD 8 tractor which is equipped with a Le Tourneau bulldozer and a Willamete Hyster winch. Four 5-cubic yard trucks haul the rock about 300 yards downgrade to the plant.

The trucks back on a ramp from which position the rock is discharged over a 6-inch rail grizzly into the 28 by 44-inch jaw primary crusher. The material which passes through the grizzly is discharged on a 36-inch by 40-foot belt-conveyor and serves as a cushion for the product of this crusher. From the belt-conveyor the rock is discharged through split chutes into two Allis-Chalmers Number 10 Superior McCully gyratory reduction crushers. The minus-4-inch product of these machines is carried on a 36-inch by 25-foot belt-conveyor to another split chute feeding two Symons standard cone crushers. The product of these crushers is carried on a 36-inch by 180-foot belt-conveyor to a pair of Symons (Los Angeles) 40-inch by

Workmen picking deleterious material, vegetation, etc., from conveyor between secondary and tertiary crushers.

16-foot 3-deck screens which do all the sizing. These are equipped with 1½-, ¾- and ¼-inch wire cloth. Men are stationed along these conveyors to remove shale, mudballs, twigs and roots from this material.

Of the four wooden bin compartments one is used for 1½-inch oversize rock and two for the ¾-inch concrete rock. The minus-¼-inch waste falls through the bottom decks of the screens into a covered bin. This dust is hauled to a stockpile and some of it may later be used by the state highway department for black-top road maintenance. The 1½-inch oversize rock is trucked back to the primary crusher. The

(*Continued on page* 40)

Portable Plants Play Important Part in War-Construction Work

Plant near Gary, California which is supplying 150,000 tons for a bomber factory.

THE tremendous program of war construction now under way throughout this country has kept operating at capacity those aggregate producers located within economical shipping distance of one or more of these projects. It has also kept busy practically all the portable aggregates plants which formerly subsisted mainly on highway work. A typical portable plant operator is Peter L. Ferry, head of the firm of Ferry & Polk, contractors, with offices at Glendale, California. For many years Mr. Ferry did highway and street paving and similar work, using portable plants to produce the aggregates on most of the jobs. When the war-construction program began he immediately sought and obtained contracts to produce aggregates for the construction of airports, flying fields, etc.

At present the company has one plant working on a project near Palmdale, near the edge of the Mojave Desert. Another has been in operation since July 1 near Gary, about 10 miles east of Santa Maria, California, supplying 150,000 tons of sand and gravel for the construction of the Santa Maria bomber base. This plant has been operated 12 hours daily and seven days a week. Some of the construction work is also being done under a subcontract. This work will be completed by the time this article appears and the plant will be moved at once to another vital project. The Santa Maria project lies in a fertile irrigated valley where the chief agricultural products are beans, alfalfa and sugar beets.

The deposit from which this plant is being supplied is the old dry bed of the Sisquoa River. It contains about 60 per cent. sand, some of which must be wasted during the production of 50,000 tons of concrete aggregates up to 1½ inches in size. In the production of the 100,000 tons of pit-run material included in the contract none of the sand is wasted. All the gravel must be reduced to under 1 inch in size.

There is no overburden to be removed. The material is dug to a depth of 10 to 12 feet by two ¾-cubic yard gasoline drag-lines, a Bay City and a Koehring, both equipped with Esco drag-line buckets. Below this level clay is encountered. Dump trucks haul the material a few hundred feet to the plant hopper into which they discharge from a ramp.

The plant actually consists of two sections. The first and main section is a Cedar Rapids 1036-4020 Super Tandem portable crushing and screening plant. This is followed by a Madsen washing plant which is used only when concrete aggregates are being produced. Both plants are electrically operated with 440-volt current. The crushing plant is driven by a 100-horsepower General Electric motor. The washing plant screen and conveyor are driven by small electric motors.

The material is fed from the plant hopper by a belt-feeder on a conveyor which feeds the Cedar Rapids 2-deck screen over the crushers. In the production of pit-run gravel the plus- 1½-inch oversize which passes over the top deck goes to the 9- by 36-inch Cedar Rapids jaw crusher. The 1- to 1½-inch material from off the bottom deck goes to the 24- by 40-inch Cedar Rapids double-roll crusher. The minus-1-inch product of both crushers is fed by a short

Tractor shovel loading from stock-pile.

belt-conveyor to the Roff transfer wheel which elevates it to the conveyor ahead of the screen. The minus-1-inch material which falls through the bottom deck of the screen is discharged on a wheel-mounted boom belt-conveyor. From this conveyor the dry pit-run material is discharged through a split chute into a Cedar Rapids 50-ton steel bin for loading into trucks. The output of this material averages 300 tons per hour.

When only concrete aggregates are being made the roll crusher is by-

Another plant view with transfer wheel at right.

passed and the minus-1½-inch material is chuted from the portable conveyor to a Barber-Greene belt-conveyor feeding the washing plant.

Two of the gasoline-powered drag-lines loading at pit.

This conveyor discharges the material on a Symons 2-deck spray-equipped washing screen with split decks which make possible the production of three sizes of material—minus-¼-inch sand, ¼- to ¾-inch gravel, ¾- to 1½-inch gravel—and a small amount of oversize. These are discharged into the four compartments of the Madsen steel truck-loading bin. When producing washed concrete aggregates only, an output of 200 tons per hour is obtained.

Sometimes it is found desirable to produce both pit-run and washed aggregates at the same time. In this case the crushing plant produces minus 1-inch material which is split to the pit-run loading bin and the washing plant conveyor in the desired porportions. Under this arrangement washed sand and ¾-inch gravel only are made by the washing plant, and a small quantity of ¾- to 1-inch gravel which is sold as drainage rock. Excess sand beyond the capacity of the bin compartment is flumed to a pile from which it is loaded into trucks by a Trackson Traxcavator mounted on a Caterpillar RD4 tractor. All the deliveries to the project are made in hired trucks. Shipments are weighed on a Hardy truck scale.

Joint Ventures *(from page 38)*

plant has an output of about 1,500 cubic yards of usable ¾-inch rock in 24 hours. A fleet of eight hired trucks hauls this rock to the project. Some of it is stock-piled by the trucks. A Browning ½-cubic yard crane mounted on a Mack truck is used for rehandling this material.

The source of sand is a high-grade deposit on a mountainside. The sand contains very little silt and does not even need to be washed in order to meet specifications. The removal of a small amount of over-size is all that is necessary to make it usable. A Cat-

B. C. Leadbetter, project manager, and H. E. Parrish, plant superintendent.

erpillar tractor, equipped with a bulldozer, pushes the sand into a hopper from which a belt-conveyor carries it to a Symons (Los Angeles) screen. The finished product is discharged into a bin from which it is loaded into trucks for haulage to the project.

As the batching operations are located within the depot area no visitors are permitted and only brief mention can be made of them. The trucks discharge the aggregates into four wooden bins from which belt-conveyors feed the Conveyor Company steel plant bins. Bulk cement is used and this is handled by a Conveyor Company storage system with a 20,000-barrel-capacity laminated wood reserve storage bin with feed and reclaiming screw-conveyors. Conveyor Company weighing batchers are also used. This plant can batch 3,000 cubic yards of concrete in 24 hours but has so far been called on for a peak output of only 2,250 cubic yards.

The fleet of 24 truck-mixers includes all the well-known makes but all are of 4-cubic yard capacity. They are mounted on Ford and International truck chassis. For some of the more distant pours four transfer rigs are available. Dry-batched aggregates and cement are hauled from the main batching plants to these rigs from which they are loaded into the truck-mixers.

The project manager for Joint Ventures, Inc., is B. C. Leadbetter, who has never before been connected with either of the three parent companies. He has had a long and varied experience in large scale material-handling. H. E. Parrish, superintendent of the aggregate plants, had been connected for years with state highway department crushing and stabilizing operations.

New Standard Eliminates 170 Sizes of Wire Rope

A proposed Simplified Practice Recommendation for Wire Rope has just been submitted to producers, distributors, users, and others interested for approval or comment, according to an announcement by the Division of Simplified Practice, National Bureau of Standards.

This recommendation, which includes sizes, constructions, grades and breaking strengths of the vast majority of tonnage of wire rope, is based on an exhaustive analytical review of existing published standards of the industry. The recommendation is designed to conserve strategic materials and available productive capacity for the war program and at the same time adequately care for important consumer requirements.

General adherence to the twenty tables shown in this recommendation will result in a net reduction in variety, from 973 items to 643, or 33.9 per cent. The major production and use of wire rope, and therefore the predominant tonnage is covered by four different rope-constructions, where the reduction in variety is from 352 items to 182, or 48 per cent.

The proposed recommendation was developed by the Contact Committee of the Wire Rope and Strand Manufacturers' Association at the request of the Wire and Wire Products Section, Iron and Steel Branch of the War Production Board.

Quarrymen Discuss War-time Accident Prevention at 1942 Safety Congress

THE Cement and Quarry Section of the National Safety Council held a very interesting annual meeting in connection with the National Safety Congress at Chicago, October 28 and 29.

Delegates from representative producers of cement, commercial and dimension stone, sand and gravel, lime, gypsum, silicon and refractory materials from many states assembled at Hotel Sherman to discuss safety subjects of common interest and select section officers for the coming year. The guests of the section included Daniel Harrington, chief, Safety and Health Branch, U. S. Bureau of Mines; Thomas J. Quigley, chief, Mines, Quarries and Explosives Division, Pennsylvania Department of Labor and Industry; Thomas P. Kearns, superintendent of Safety and Hygiene, Ohio Industrial Commission; E. J. McCrossin, chief mine inspector, Alabama Department of Industrial Relations; Dr. M. H. Kronenberg, chief, Division of Industrial Health, State of Illinois; David Vaage, director of the Safety Service, International Labor Organization, Montreal; R. B. Morley, general manager of the Ontario Industrial Accident Prevention Association; and Col. John Stilwell, president of the National Safety Council.

The nominating committee of the section, of which R. A. Ditmar, superintendent of the Universal Atlas Cement Company at Hudson, New York, was chairman, presented a slate of nominees who were declared elected by unanimous vote of those present. The new officers are:

General chairman, W. M. Powell, Medusa Portland Cement Company, Cleveland; vice-chairman, H. F. Yotter, General Crushed Stone Company, Easton, Pennsylvania; vice-chairman, David Adam, Lawrence Portland Cement Company, Northampton, Pennsylvania; secretary, J. R. Boyd, National Crushed Stone Association, Washington, *News Letter* editor, J. Dempster, Canada Cement Company, Ltd., Montreal, P. Q., Canada; Engineer Committee chairman, J. Norvig, Pennsylvania-Dixie Cement Corporation, Nazareth, Pennsylvania; Membership Committee chairman, F. L. Maus, Alpha Portland Cement Company, Easton, Pennsylvania; Program Committee chairman, L. P. Warner, Jr., Warner Company, Philadelphia; Publicity Committee chairman, P. N. Bushnell, Missouri Portland Cement Company, St. Louis; and Statistics Committee chairman, W. W. Adams, U. S. Bureau of Mines, Washington.

The section executive committee will consist of the above and the following members elected at large: V. P. Ahearn, National Sand & Gravel Association, Washington; E. D. Barry, Universal Atlas Cement Company, New York; H. M. Beatty, Kelley Island Lime & Transport Company, Cleveland; F. J. Buffington, New York Trap Rock Corporation, New York; A. J. R. Curtis, Portland Cement Association, Chicago; R. A. Dittmar, Universal Atlas Cement Company, Hudson, New York; O. M. Graves, General Crushed Stone Company, Easton, Pennsylvania; H. A. Reninger, Lehigh Portland Cement Company, Allentown, Pennsylvania; S. W. Stauffer, National Lime Association, Washington, and A. L. Worthen, New Haven Trap Rock Company, New Haven, Connecticut.

A. J. R. Curtis, assistant to general manager of the Portland Cement Association, who has been secretary of the section since 1926, urgently requested that he be relieved of these duties. After reluctantly complying with Mr. Curtis' request, J. R. Boyd, administrative director of the National Crushed Stone Association, was chosen for the position of secretary by unanimous choice of the nominating committee and members. Mr. Boyd has been an untiring advocate of safety in the stone industry for many years and served several terms as member of the executive committee of his section and of one of its predecessors, the quarry section.

A unanimous resolution was passed, bestowing the thanks of the Cement and Quarry Section on Mr. Curtis for his long years of work as secretary and he was then elected a member at large of the section executive committee. At the meeting of the members of the National Safety Council on November 27 Mr. Curtis was elected a director of the council and subsequently he was elected a member of the excutive committee of the council.

Almost the entire afternoon session on November 29 was occupied with the discussion of explosives and other quarry hazards. The safe use, handling and storage of dynamite, black powder and various types of exploders received particular attention. The discussion was opened by a paper on the subject by E. L. Thayer, engineer of the Technical Division, Explosives Department of E. I. du Pont de Nemours and Company. Mr. Thayer's paper contains so much practical information that with the approval of the National Safety Council it is reproduced on page 43, almost entirely as presented.

G. S. Parker, plant superintendent of the Dewey Portland Cement Company, Davenport, Iowa, and Herbert Rich, quarry superintendent of the Pennsylvania-Dixie Cement Corporation at Nazareth, Pennsylvania, led a very interesting discussion of the subject. Among others who spoke were Bernard L. McNulty, president of the Marblehead Lime Company; M. P. Greer of the Marquette Cement Manufacturing Company; David Adam of the Lawrence Portland Cement Company; Johan Norvig, general superintendent of Pennsylvania-Dixie; and R. R. Currie, recently of the U. S. Bureau of Mines.

J. H. East, Jr., mining engineer of the Minerals Production Security Division of the U. S. Bureau of Mines, presented an interesting paper on sabotage and methods of protection against saboteurs. For obvious reasons Mr. East spoke "off the record." Col. H. A. Reninger, past president of the National Safety Council and now assistant director of the Third Civilian Defense Region, Baltimore, also spoke on plant security, referring particularly to black-out techniques.

Technical Training for War Industry was the subject of an interesting paper at the session on November 28. The speaker was Professor John I. Yellott of the Illinois Institute of Technology who has already supervised the wartime training of over 26,000 industrial workers. Professor Yellott described in detail the Job Instructor Training

Courses being administered by the War Manpower Commission.

A. J. R. Curtis presented an analysis by the Portland Cement Association of cement-plant accidents during the first nine months of 1942, which indicated a continued gain in the general accident rate as well as a surprising increase in the proportion of accidents occurring to newly-employed men.

Portland Cement Association member plants suffered 242 accidents in all chargeable classes in nine months of 1941 and 296 such accidents in the corresponding period this year—a gross gain of over 22 per cent. Adjusting for the estimated difference in man-hours of exposure, Mr. Curtis believes that the frequency rate is at least 15 per cent. greater this year than last.

In 1938 7.5 per cent. of the accidents were suffered by men at work less than a year. In 1940 the corresponding ratio was 18.9 per cent. and for the first nine months of 1942 it was 44.3 per cent. These figures show that, safetywise, the new-man problem now eclipses all others and should receive a correspondingly large proportion of the time available to fight cement-plant accidents.

ACCIDENTS IN PORTLAND-CEMENT PLANTS

Gross Number of Lost-time Injuries and Fatalities

Jan. 1 to Oct. 1, 1941	242
Jan. 1 to Oct. 1, 1942	296
Increase	22.3%

Causes of 1942 Accidents (9 months)

Personnel faults: 50% (wrong attitude 30.5%; lack of knowledge or skill 18%; physical defects 1.5%).

Environmental faults: 50% (hazardous arrangement 25%; defective agencies 11.5%; unsafe dress or apparel 9.5%; improper guarding 4%).

Accidents to Men Employed Less Than One Year (9 months of 1942)

	On Job Less Than One Year	On Job One Year or Longer
January	11	14
February	9	17
March	15	34
April	14	15
May	13	19
June	11	17
July	14	22
August	24	10
September	20	17
Total	131	165

Proportion of new men injured (9 months) 1942 ..... 44.25

Proportion of new men injured 1940 ..... 18.90

Proportion of new men injured 1938 ..... 7.50

In suggesting means for correcting the severe accident rate among the newly hired workers, Mr. Curtis said in part:

"We seem almost barren of methods sufficiently colorful and dynamic to capture and hold the interest of our recruits. We have often sat back and let someone else lead. A good many reputed or supposed leaders have given little more than lip service.

"Effective safety work requires more time and more thought than formerly. Most plants work more man-hours. A given number of man-hours often represents a greater number of individuals. These individuals average lower in quality than those who came to us in the past.

"The present influx includes many men of draft age ineligible for military service, unskilled and inexperienced in industry. There are also immature boys, old men and a small but increasing number of women. Unfortunately, many newcomers regard their stay among us as only temporary and not worth any special effort to learn about it or to expedite their assimilation. Some of them look like accidents going somewhere to happen. Many of us take them just as they take their jobs — not worth the investment of much effort.

"Something effective has got to be done about this situation.

"At the outset you and your organization can almost make or spoil a new man from the standpoint of safety interest. The job of selling him safety is almost entirely one of selling him on your organization and those of whom it consists.

"The procedure followed in receiving the new man should be carefully planned and rehearsed. He should be impressed by interviews with his superintendent, personnel and safety directors and department head. Each must have a specific field to handle with him—specific ideas to implant and specific impressions to leave.

"One reason why these contacts should be carefully and specifically planned is that the new workman can repeat them only infrequently and he must base his estimate and acquire his impressions of his leaders largely from what he absorbs on these infrequent occasions. They must sell him absolutely on the dynamic qualities of his plant leadership and the intense interest of his leaders in his own safety.

"Then it is fully as important that fellow workers develop, by every means within their power, a feeling of good will and good fellowship that will meet the new man at the entrance and follow him wherever he may go in the plant. You can get the recruit steamed up on safety more quickly by making it obvious to him that he is fortunate in having landed among good friends and in the midst of a hotbed of safety enthusiasm. In making him acquainted let him know the position in the safety organization of each man he meets and refer to special records or honors held by those to whom he is introduced.

"Every loyal worker must be a 'good neighbor' to every new man. That is the way life-long friendships, as well as fine safety organizations, are made. The neighborly interest of fellow workers is important to the success and the safety of the newly-hired man.

"You must have an honest-to-goodness safety program with a place in it for everyone. Unless your management and plant leaders are genuinely interested you can not have such a program. No propaganda campaign will do. This is a heart-and-soul job.

"Leaders can supply much that is essential to success but they can't do the job alone. Fellow workers are the ones who must make it natural, pleasant and interesting for the new man to line up and remain lined up for safety.

"Devise a plan whereby the new man will not have to wait but will immediately see an active and enthusiastic plant safety committee in action. Have him visit safety-committee meetings and make sure that he understands and likes what goes on. Committee meetings should have 'guests.' Committees may have 'junior members' or 'special members.' Show new men the desirability of getting on the safety committee or of serving it as often as requested.

"Sell the new man on the safety rules and regulations. One of the best ways is to discuss them from an impartial viewpoint. Hear both sides of the argument. Tell new men how the rules or 'safe practices' were developed, who developed them and why.

"Don't overlook the new man's particular need for help when tackling new and dangerous jobs. When a man is assigned to another shift or job or his employment conditions are altered in any way, new hazards

may be set up and the man must be warned accordingly.

"Don't forget the necessity for frequent repetition of instructions and warnings. The new man should be taught to ask rather than take a chance.

"Finally, the most powerful instrument in protecting the new worker is *good example*. Few other means, if any, can do so much. If every man in the plant sets a good example all the time, the new worker will fall into line almost at once. Don't overlook the evil effects of bad example, especially by supervisors and old timers.

"We hear much about seniority *rights* but little about seniority *responsibility*. Experienced workers have a priority on responsibility toward newscomers as well as a golden opportunity to help them avoid the scourge of accident."

Safety in Handling Explosives*

By E. L. THAYER,
E. I. du Pont de Nemours & Company

YOU all are aware that commercial explosives are necessary for the economical production of most of the basic materials that are so vital to our national progress. This statement was true before Pearl Harbor, it is true now, and it will be equally true when we are again at peace. As evidence of this, I cite the fact that the commercial users of explosives in this country alone have consumed over 1,000,000 pounds of dynamite and 300,000 pounds of black powder every working day during the last 15 years.

Every pound of this must be transported from the factory to the point of use either by railway or highway. Statistics show that since 1926 there have been no deaths or personal injuries connected with the railway transportation of dynamite or black powder in either the United States or Canada. I do not have the actual amount of explosives hauled by the railways in this 15-year period, but it is certainly more than 4,000,000,000 pounds.

You can be sure that a record like this is due to strict observance of carefully-drawn regulations, and it is concrete evidence that explosives can be handled safely. It is, of course, the desire of every consumer of explosives to achieve a similar excellent safety record. To accomplish this it is necessary to provide suitable rules governing the handling of explosives under all conditions existing in your various operations. In most cases these rules are already in existence. The safety posters and other publications issued by the National Safety Council and the various explosives companies, the pamphlets from the Institute of Makers of Explosives, the almost too familiar case inserts placed in each case of dynamite or caps setting forth the famous 53 "Don'ts" regarding safety in the handling and use of explosives, the state and local laws covering in detail the location and construction of all types of magazines, the force of inspectors whose duty it is to see that these laws are obeyed, the printed safety rules posted in all magazines and those drawn up by the larger stone producers, these are all readily available to help you to use these convenient forms of concentrated energy with safety. Yet we still have accidents with explosives. Why?

The Institute of Makers of Explosives attempts to tabulate all explosives accidents each year. In the last three years they listed an average of 93 accidents per year which caused 63 deaths and 115 personal injuries annually. In 73 per cent. of the cases the true cause was determined. Carelessness and premature shots (usually a form of carelessness) head the list with 22 per cent., while improper use and returning too soon account for 10 per cent. Children playing with caps caused 21 per cent., which stresses the importance of educating them to leave these attractive objects alone. Actually these cap accidents should come under the heading of carelessness, as they are nearly always caused by some adult carelessly leaving caps where the youngsters can find them. Thus, at least half and probably three-quarters of the accidents with explosives are due to some form of carelessness. This fault may be due to the "familiarity that breeds contempt," to ignorance or to bravado. Whatever the cause, management must combat it by selection and education of the blasting personnel and by showing an active interest in safety. It is almost axiomatic that if the "big boss" is really interested in safety, the operation will have a good safety record.

The manufacturers are doing their utmost to build uniformity and dependability into their products so that their action under a given set of conditions may be predicted. Dynamites are complex mixtures of nitroglycerin, oxidizing salts, absorbents, and fillers. All these ingredients, as well as the finished product, are subject to rigid chemical control during all phases of manufacture. This insures that the various components are uniformly within specifications and that successive batches of the same grade are uniform in properties. Chemical research has enabled the manufacturers to replace substantial percentages of sensitive expensive nitroglycerin with the much safer and more economical ammonium nitrate. The resulting dynamites are much safer to handle than those of 20 years ago and yet they perform the same work just as effectively and efficiently at a lower cost. Research toward safer commercial explosives has not stopped, and we are certain to see further improvements in the years to come. However, we must never forget that explosives are manufactured for one purpose only, and that is to explode.

The consumer must prepare for the safe handling of explosives before they arrive on his property. Properly located and constructed magazines must be provided, and, of course, blasting caps and dynamite must not be stored together. In fact, these two materials should be kept apart just as long as possible. Care should be exercised in transferring the explosives from the freight car or the manufacturer's truck to the consumer's magazine. The boxes should be lifted and carried, not thrown, and should be piled carefully in neat piles. Arrangements should be made to insure that old stocks are used first, as dynamite may deteriorate in storage. Of course, no one should be allowed to open cases of dynamite in a magazine, and good housekeeping both in and around the magazines is so important and customary that further comment is unnecessary.

The manufacturers of explosives and the railroads have strict rules regarding the condition of the equipment used for the transportation of dynamite. It is only logical that the customer should transport dynamite between his magazine and the shot in trucks which are in good repair. The steering gear and the brakes should be in good working order, and they should not have leaky gasoline lines or loose or exposed "live" wires. We do not recommend that caps be carried in the same load with dynamite.

*Presented at 1942 National Safety Congress.

Smoking or carrying matches within a distance of 150 feet of a magazine or a shot should be prohibited, and this rule should be rigidly enforced. An occasional recess may be granted during the loading of a shot so that the men may withdraw from the shot area and enjoy a smoke.

The men who handle explosives should be picked for their intelligence and good sense. They should be fully conversant with the safety rules and the characteristics of explosives, what is safe to do with them, and what is dangerous. New men should be continually trained by the older experienced workmen and no one should be allowed to handle explosives until he has been thoroughly instructed. Anyone who displays a tendency toward carelessness or recklessness should be removed from the crew immediately.

The number of men engaged in any blasting operation should be held to the minimum consistent with efficiency. This requires systematizing the work so that each man has definite duties. All persons not necessary for the successful loading of the shot should be kept away from it. This applies to curious visitors as well as idle workmen.

The management should designate some competent person to be in charge of all blasting operations, and this person should be given sufficient authority to make sure that his instructions will be obeyed. He should be authorized to order any employee from the scene of a blasting operation if this individual insists on following unsafe practices or is under the influence of liquor or narcotics. It should be his responsibility to keep an accurate account of all pertinent data in reference to the loading of the shot. These will include the depth of the holes, the amount of explosives in each charge, and the position of the decks and the points at which stemming starts in each hole. His records should also show any unusual circumstances connected with the loading, such as the location of an obstruction in the hole.

It is recommended that the work of figuring the charge per hole, and whenever possible, the bailing of holes and the distribution of stemming, be done before the explosive is delivered to the shot. This will reduce the man exposure hours and allow the foreman to give full time to the supervision of the loading operations.

The foreman should insist that all electric cables be removed from the shot area before loading is started. No one should be allowed on the quarry floor in front of the proposed blast during the loading operation. If a blast consists of a combination of well-drill holes and snake holes, the snake holes should be completely loaded before starting to load the well-drill holes.

When dynamite is delivered to the location of the shot, the cases should be placed carefully on the ground in neat piles at designated points. These piles should be arranged so that if one of the holes being loaded should explode prematurely, the explosion is not likely to propagate to the piles on the top of the ground. We suggest that the main piles of explosives be located at least 150 feet back from the row of holes. The unopened cases should be carried to an opening station not closer than 25 to 50 feet from the line of holes, this distance to depend upon the charge per hole. For instance, if the charge is less than 200 pounds, 25 feet should be satisfactory. However, regardless of the load, we recommend that the supply at the opening station never exceed 400 pounds and that the opening stations be located at least 50 feet apart. Hard wood or non-metallic tools, such as wedges and mallets, should be furnished and no one allowed to open wooden cases except with these implements. If fiberboard containers are used, they should be opened with the usual patent cutters or slitters which are designed for this purpose, and which may be obtained at any hardware or 10-cent store.

As a further precaution toward minimizing the damage from the premature explosion of a hole during loading we suggest that the loading crews be separated by as much distance as practical and never less than 35 feet. Suppose you are loading an 8-hole shot with two loading crews and the space between the holes is 15 feet. One crew should start at hole number 1 and the other at hole number 5, and both work in the same direction. In this case the two crews should remain 45 to 60 feet apart without difficulty.

The opened cases should be carried to a point about 6 feet from the hole at such a rate that not over two cases are at the hole at any one time.

If electric blasting caps are to be used for priming the holes, they should not be piled with the dynamite, but should be located about half-way between the opening piles. They should be kept in the original cartons until needed and the foreman of the loading crew should be responsible for their distribution. We recommend the placing of two caps in the main charge and one in each deck. The caps in any hole containing two or more charges separated by stemming should be connected in series.

When Primacord is used, the line should be cut from the spool as soon as the primed cartridge has been properly seated and the spool should be taken to the next hole to be loaded. The end coming from the hole should be drawn taut and securely fastened at one side where it will neither interfere with loading nor come in contact with the dynamite on the top of the ground.

If the holes are unusually rough or ragged, the Primacord or electric blasting cap should be placed in the first cartridge to go into the hole. Then, if the hole becomes blocked with a rock during loading, there is an excellent chance of detonating the bottom load, which would otherwise probably remain unexploded in the wall. The danger of such unexploded charges to personnel and equipment can not be overemphasized.

When the holes contain water, the cartridges should be lowered until they build up above the water level, after which it is satisfactory to drop them, provided the holes are reasonably smooth. If the holes are rough so that there is danger of hanging the cartridges up before they reach the bottom, or of blocking the holes by dislodging rocks from the side, time will be saved by lowering the entire load.

A tamping block on the end of a rope is sometimes necessary for tamping explosives in well-drill holes. The block should be of hard wood to resist wear and weighted with a nonsparking metal so that it will sink in water. It should not have any exposed metal parts, or be too heavy for ordinary everyday use. It is operated by lowering it into the hole until it rests on the dynamite, then raising it a foot or two and letting it drop.

Wagon-drill and snake holes of course require that the cartridges be slit and tamped. Wooden tamping poles with no exposed metal parts should be used and the ends should be cut off squarely in order to work efficiently. It is recommended that the dynamite be slit at or near the hole as it is needed. This will prevent scattering the dynamite over a large area of ground or the possibility of slitting too much so that it must be sent back to the magazine where it may absorb moisture and become insensitive.

In the interests of safety dyna-

mite should, whenever possible, be loaded in the wrappers as received from the manufacturer. This can usually be done if sufficient thought is given to the relationship between the diameter of the hole and the diameter of the cartridge before the order is placed. This does not of course refer to the free-running type of dynamite which is designed to be poured into the holes. If the holes are so rough that they will probably be lost through the loading of cartridges as manufactured, it is of course necessary to "shuck" the dynamite. This requires the exercise of care to prevent the dynamite being scatered around the collar of the hole. When the condition of the holes makes it necessary to cut gelatin into small pieces in order to prevent blocking the hole, the operation should be done with a sharpened wooden paddle in an empty dynamite box in order to prevent mixing grit with the dynamite.

Sometimes, in spite of all these precautions, holes will become blocked, and the treatment of those holes often presents a definite hazard. The use of the usual tamping dolly may merely pack the obstruction tighter and pave the way for more violent and more dangerous measures.

A much more satisfactory block for freeing a plug of dynamite may be made from a 10-foot piece of 2 by 4. The lower 4 feet should be cut down to 2 by 2 or smaller and the botom 4 inches made into a sharp point. I have used such a block many times and have found it to be very effective.

It should be lowered into the hole until it rests on the stuck cartridge and then moved carefully up and down. In most cases it will break up the cartridge so that it may be dislodged by the shoulder of the block. Always use extreme care in this operation. It is advisable to pour some water down the hole before starting to dislodge a cartridge and at intervals during the operation. Never put any metal implement or even a wooden tamping block tipped with metal into a bore hole containing explosive. When surface conditions make it possible, heavy tamping blocks in deep holes may be operated through a tripod erected over the hole. This will make it unnecessary for the men operating it to stand directly over the hole.

When tamping blocks are being used, no explosives should be allowed on the surface within 10 feet of the hole. On removal from the holes tamping blocks should be rested on box-lining paper or in empty dynamite cases to prevent gravel and grit being introduced into the hole. Do not operate a tamping block too vigorously as this may injure the Primacord or electric blasting-cap wires.

If the hole has become blocked with a rock after loading has started, it will usually be wiser to make no attempt to free it because of the hazard of friction between the rock and the dynamite. If the hole is not completely blocked off, it may be possible to continue loading by "shucking" the dynamite and pouring it down the space between the rock and the side of the bore hole. Otherwise, it will be necessary to continue loading on the top of the rock if there is sufficient room, or to stop loading this hole and depend upon the charge in the adjacent holes to pull the burden. Every precaution must be taken to make sure that the Primacord or electric blasting-cap wires are still intact.

It occasionally happens that the hazard of dislodging a stuck cartridge of dynamite is so great that it should not be attempted. This case should be treated as just described.

If a thunderstorm threatens while holes are being loaded, connected, or fired, the operation should be stopped at once as there is danger that lightning may strike the explosive directly or may discharge electricity to detonator wires and thus set off one or more of the primed charges. Everyone should leave the shot as soon as possible. The time to ward off accident from a thunderstorm is when the first threat of storm is observed. Furthermore, it should be realized that an approaching storm frequently creates as much electrical disturbance as one in progress.

After being loaded the holes should be completely filled with stemming material, preferably sand or clean crusher screenings. Ordinarily it is not necessary to use a tamping block to settle the stemming in well-drill holes, as it will be sufficiently compacted by the action of shoveling it down the hole and by its own weight. Small-diameter poles may be used to prevent bridging of the stemming material in wagon-drill and small well-drill holes. Care must be observed during both the loading and tamping operations to avoid damaging either the Primacord or the cap wires. It is recommended that they be protected by a covering of box-lining paper or fiberboard at the collar of the hole.

Regardless of the method used for firing a blast, no attempt should be made to connect up until excess dynamite, boxes, tamping blocks, and so forth have been removed and all persons not needed for the actual operation of connecting sent off the shot. This will eliminate the possibility of a careless person tripping over and breaking connections.

Before starting to hook up a shot primed with electric blasting caps, the foreman should make certain that the firing switch on the power-line is locked in the "off" position, and that the lead lines are disconnected from the blasting machine or other source of power and are short-circuited. The work of making the connections should proceed in a logical and orderly manner so that it will not be necessary for the men to walk over the finished connections. One easy way of assuring this condition is to begin hooking up at the end of the shot farthest removed from the source of power. Series connections should be checked with a properly-constructed circuit tester (blasting galvanometer) before connecting to the lead wires or, in the case of parallel series circuits, before connecting to the bus wires. Before attaching the lead lines to the shot the foreman should send all the workmen off the shot, approve all the connections, check the lead line with a blasting galvanometer, and make sure that it is short-circuited on the power end. Care should be taken to use an adequate length of lead wire to insure that the man firing the blast will be in a safe place.

Electric blasting caps should be fired with a blasting machine or by means of a positive double-pole switch. Shooting with makeshift contacts or with dry cells should not be allowed.

Primacord shots may be detonated by either fuse and cap or electric blasting caps. If the shot is to be fired with an ordinary blasting cap, the cap should be securely fastened to the safety fuse with a cap crimper and seated on the freshly-cut end of the Primacord with a union. The fuse should be long enough to allow the man who lights it plenty of time to reach a place of safety without running.

If an electric blasting cap is used to initiate the Primacord, it must be securely fastened to the freshly cut end of the Primacord with a union.

Before firing, flag men or guards should be placed a safe distance away from the blast and at such locations that they can prevent anyone approaching the shot. A simple, standard and positive system of sig-

(*Continued on page 48*)

Poorly-Graded Raw Materials Made to Yield Suitable Concrete Aggregates

WHEN the Pierce Island Gravel Company of Portland, Oregon, late in 1940 accepted a contract for the production of over 200,000 cubic yards of sand and uncrushed gravel for the completion of Bonneville Dam it did so with full knowledge of the fact that suitable material was scarce in that area. The producers who supplied the aggregates for the main part of the dam several years ago had to range far and wide to find material of the right gradation and similar problems were expected at this plant. In spite of these and other difficulties the company has kept its deliveries ahead of construction schedules.

This company was formed by the Portland Gravel Company and the Pacific Building Materials Company of Portland. The former is a wholesale producer of sand and gravel and the latter produces primarily for retail sale. The sand and gravel produced is being used by the Puget Construction Company of Seattle in the construction of the power-house and other miscellaneous work at the dam. It is also expected that paving projects along the Columbia River and other vital work will be supplied from this plant.

Pierce Island seen from the north bank of the river. Plant visible at extreme right tip.

The company derives its name from the fact that the plant and main deposit are both located on Pierce Island, which is 32 miles up the Columbia River from Vancouver, Washington. This location is hard to match for natural beauty. The island is visible from the scenic drive for which this stretch of the river is famous. On the north bank of the river is Beacon Rock, a landmark visible for many miles up and down the river. Along the south bank of the river are the many beautiful waterfalls which make this drive a tourist "must."

By W. E. TRAUFFER

The deposit was in the form of a bar at the upper end of the island which was thoroughly prospected before the plant was built and found to contain material good enough to pass the rigid government specifications. It contained 25 per cent. sand, 50 per cent. gravel from ¼ to 2 inches in size, and 25 per cent. of gravel ranging from 2 up to 7 or 8 inches in size with few boulders. There was little variation in this material down to 50 feet below the water level, which was the maximum depth to which it was excavated.

The first step was to remove all the material down to a foot above water level. This was done with a 1½-cubic yard Link-Belt gasoline drag-line, and six Ford trucks were used to haul this material to the plant. When the dry material was exhausted, the bar was worked over again with the same drag-line digging to about 15 feet below the water level. Every effort was made to finish this part of the operation before the arrival of the spring high water, which raises the water level 17 feet above normal. By February 1941 all this material had been excavated and a 60,000-cubic yard reserve stock-pile of raw material had been built up on high ground near the plant. Meanwhile a dock-and-conveyor system had been built to replace the truck-haulage system. A clam-shell digger dredge then excavated the bar to the maximum depth of 50 feet below the normal water level.

View of the main portion of the plant showing storage piles over the reclaiming tunnel.

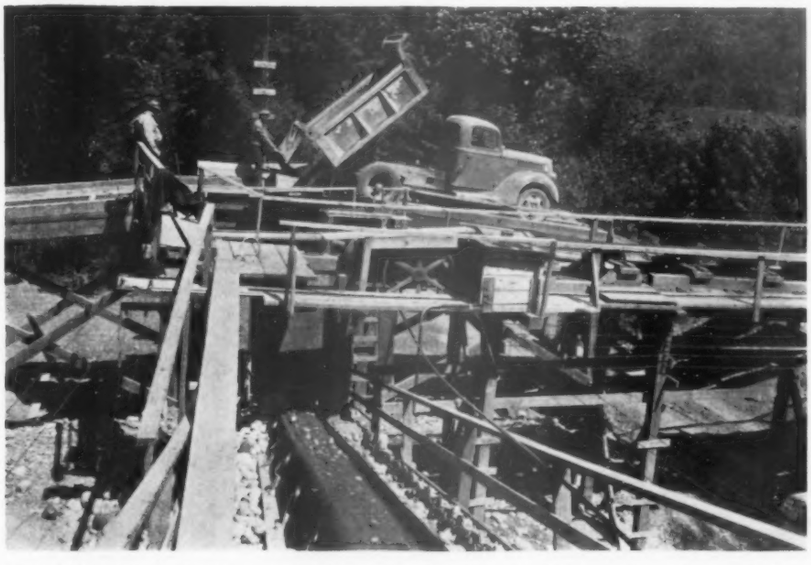
During this entire period the output of sand was barely sufficient to meet the demand and some of the excess crushed gravel was marketed in the Portland-Vancouver area where sand is plentiful and crushed gravel scarce. During the summer the main part of the bar was worked out and on July 9 the dredge started digging at Hood River, 26 miles upstream from the plant. At this point there is an excess of sand, which, with the material in the raw stockpile, should enable the company to fulfill its contract. Completion of the work on the dam is scheduled for January 1, 1943.

The plant actually began operation in May, 1941, and it has been operated from 10 to 16 hours daily except for a few weeks during the winter when a minimum temperature of 10 degrees below zero was recorded. The plant capacity was

Shovel loading a truck at raw stock-pile.

scows are unloaded at the plant by a hired digger with a 110-foot boom and 2-cubic yard clam-shell bucket.

The material is deposited in a hopper from which a reciprocating feeder discharges it on a 24-inch by 286-foot belt-conveyor which inclines slightly upward to the main plant conveyor. This dock conveyor is driven by a 20-horsepower electric motor and the feeder is driven from its tail pulley. The original hopper, which was served by the trucks, is at the end of the main conveyor and is used whenever there is a delay in barge deliveries to draw from the stock-piles. The 24-inch by 100-foot main conveyor discharges the material on a 4- by 8-foot Simplicity 1-deck screen with 2⅛-inch wire cloth.

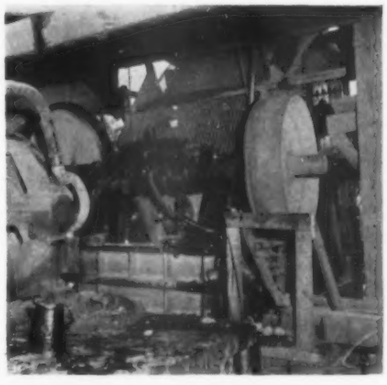


Truck discharging material from raw stock-pile to plant hopper. Conveyor from dock at right.

85 cubic yards of gravel and 20 cubic yards of sand when truck haulage was used. When dredging was begun, the steadier feed raised the gravel output to 100 cubic yards per hour. From 12,000 to 20,000 cubic yards of gravel has been shipped each month since the plant started operating, not including sand or stock-piled material.

The digger at Hood River is owned by the Pacific Building Material Company. It is steam-powered and has a 90-foot boom and a 2-cubic yard Blaw-Knox clamshell bucket. The material is loaded on 36- by 130-foot wooden scows having capacities ranging up to 900 tons each. A hired tug tows these barges downstream and through the locks at the dam to the plant. The

The oversize gravel from this screen is used for the production of crushed gravel. It drops into a 15- by 36-inch Universal Crusher Company jaw crusher which reduces it to 1½-inch size and under. This material falls on a 2- by 6-foot Simplicity 1-deck screen which has 1½-inch wire cloth and drops the oversize into a 20- by 40-inch Universal double-roll crusher with smooth rolls. The crushed gravel passing through the last-mentioned screen, together with the product of the roll-crusher, drops on an 18-inch by 16-foot belt-conveyor. This feeds the crushed gravel to a 4- by 12-foot revolving screen, which makes

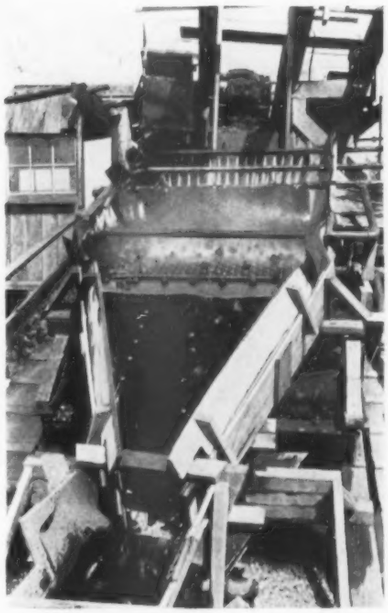


The 15- by 36-inch primary jaw-crusher.

1¼- to 1½-inch and minus- 1¼-inch products and a small amount of oversize. These products drop into bins from which they are trucked to stockpiles for shipment.

The 2-inch-minus uncrushed gravel and sand which passed through the first screen are carried on a 24-inch by 100-foot belt-conveyor to the main screening and storage building. There a 5- by 10-foot Simplicity 3-deck screen makes three sizes of gravel.

The 1½- to 2-inch gravel is car-



Screen which makes three sizes of uncrushed gravel. Note old conveyor belting used for chute lining.

ried to storage on an 18-inch by 81-foot belt-conveyor.

The ¾- to 1½-inch gravel is carried on an 18-inch by 36-foot belt-conveyor to a 3- by 6-foot Simplicity single-deck screen. This makes two sizes split at 1 inch, and these are discharged direct to storage.

The ¼- to ¾-inch gravel from the main sizing screen is discharged through a stone ladder to a 3- by 6-foot Simplicity 1-deck screen. This makes two sizes split at ½-inch, and these are discharged to storage.

The sand passing through the bottom deck of the main sizing screen drops into a trap from which it is flumed into two sand-settling tanks arranged in series. These tanks are of the automatic balanced type and are equipped with counterweighted gates of original design. The sand is discharged from each tank through a section of 6-inch pipe extending 4 inches horizontally from its base. The counterbalanced gate has an old piece of conveyor belting on its face and this effectively seals the opening when the gate is closed. The first tank makes concrete sand

Single-deck screen sizing gravel.

and the second makes a fine or "muck" sand. Both materials drop through screen sections to flumes which remove any stray oversize material and carry them to separate storage piles. Some of the fine sand is blended with the concrete sand in loading.

The seven ground-storage compartments for uncrushed gravel and sand are separated by wooden partitions and each has a live-storage capacity of about 300 cubic yards. From each compartment the stored material is drawn through two lever-operated arc gates on the 24-inch by 204-foot reclaiming belt conveyor in a 200-foot wooden tunnel under the piles. Because of the high water table, the top of this tunnel extends 4 feet above ground level. With this arrangement any size of material can be loaded out singly or any desired blend of sand or gravel, or both, can be made. The dam contract requires the blending of two sizes, ¼- to ¾-inch and ¾- to 2-inch. There is a hopper over the end of this conveyor so that stock-piled raw or sized materials can be loaded out from the stock-piles.

Roll reduction crusher and 50-horsepower motor drive.

The tunnel conveyor is followed by a 3- by 10-foot Symons 2-deck screen which is used for rewashing uncrushed gravel only. When sand or crushed gravel are being loaded, the screen cloth is removed and the material drops through on the 24-inch by 97-foot barge-loading belt-conveyor. The loading capacity is 100 cubic yards per hour when washing, more when not. Deliveries are made by five barges which hold 200 to 400 cubic yards each and are towed by another hired tugboat.

The president of the Pierce Island Gravel Company is Howard F. Puariea, who is also president of the Portland Gravel Company. Frank Pennypacker, president of the Pacific Building Materials Company, is secretary and treasurer. L. L. Sauers is in charge of all the plant and river operations. All are proud of the plant which is regarded as one of the most efficient in the Northwest. Some indication of this may be gathered from the fact that the plant has a total of 304-horsepower in installed motors exclusive of the digging and hauling equipment.

E. R. Ullrich, boatman; N. W. Senter, foreman and mechanic; and L. L. Sauers, general superintendent.

With one exception Simplicity screens are used throughout the plant. Stephens-Adamson conveyors and Pioneer conveyor belting are used exclusively. Most of the drives are V-belt and several makes are used with Gates Vulcorope predominating. Most of the motors are of Allis-Chalmers manufacture.

The wash water is supplied from the river by a 900-g.p.m. American Marsh and a 1½-inch Pacific centrifugal pump. A Caterpillar 22 gasoline tractor equipped with a bulldozer is used for maintaining roads, stock-piling, etc.

Transformers at the plant reduce the purchased electric power from 11,000 to 440 volts.

Safety *(from page 45)*

nals shall be agreed upon so that everyone around the quarry will be warned of the blast in ample time. Obviously the signal must not be given to close the switch or light the fuse until everyone has reached a place of safety. If possible, observers should stand to the windward of the shot with their backs to the sun and under no conditions should they rush back into the smoke from a shot. A few minutes' wait until the smoke dissipates will not have any effect on the results of the blast, and it will allow everyone to return to the scene in safety.

Federal Explosives Act Is Further Amended

The Federal Explosives Act, passed early this year and later revised, has been again revised by amendments approved October 9 by Secretary of the Interior Ickes. The most recent changes have to do mainly with reference to the maintenance of records.

A complete text of the amendments was published in the Federal Register of October 13. Copies of the original act and the amended regulations are obtainable from the U. S. Bureau of Mines.

For the Freedom of Humanity . . .
Buy War Stamps and Bonds

Hoosier Stone Producer Develops Own Quarry-to-Crusher Transport System

Four of the new-type skips being hand-loaded on the quarry floor.

TEN years ago Scott Milligan, superintendent of the Muncie Stone & Lime Company at Muncie, Indiana, made an analysis of his quarry and plant operations in an effort to find out why profits had declined to the vanishing point. His studies made it quite clear that it was costing entirely too much to load and transport stone from the quarry to the primary-crusher house at the plant. A steam shovel, locomotive, and cars drawn up a 150-foot incline to the crusher house were then in service for intra-plant haulage. Breakdowns were frequent, production per man-hour was low, costs were found to be all out of proportion to the amount of stone moved.

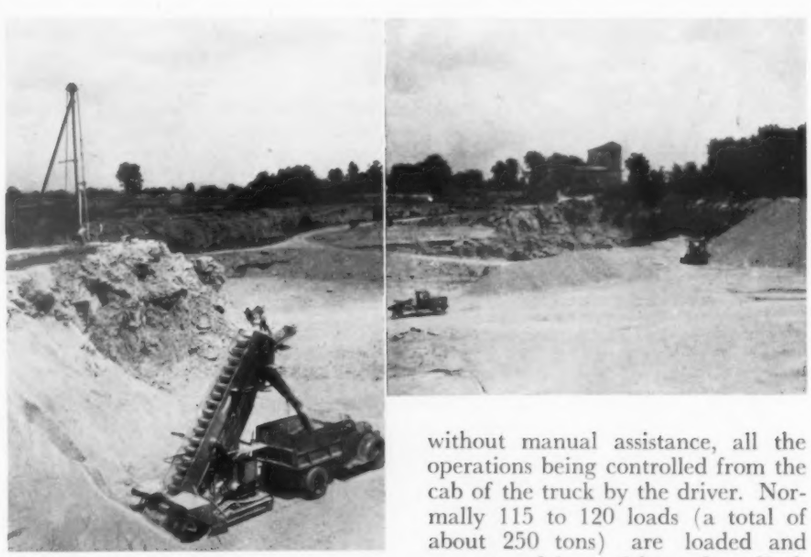
Close-up view showing truck backing under one of the skips.

So Mr. Milligan decided to do something about it. After considering and discarding various other available transport methods, he conceived the idea of having each man in the quarry load separate boxes, or skips, and carry these containers to the crusher by a motor truck, thus keeping the truck busy hauling and the men busy loading, eliminating idle time for both men and equipment.

To-day such equipment is commercially available but in 1932 Mr. Milligan had to design his own. This he did, building it as well in the quarry blacksmith shop. The first half dozen skips, equipped with steel rockers to elevate them to the truck chassis by the movement of the truck, worked surprisingly well except on rough ground. But Mr. Milligan kept improving the units until today they are doing an extremely efficient job, the present models having little in common as far as appearance is concerned with the earlier units, as the accompanying pictures testify. The latest models were patented on November 25, 1941 (U. S. Patent 2,264,216) and eleven of them are now in service in the Muncie quarry. Ten are of 2.2 tons capacity while the eleventh can carry 4 tons of stone. The larger model is used to make deliveries, for stock-piling, etc.

One of the trucks starting off with a load.

Two Ford trucks, equipped with Wood 6-inch hydraulic-hoist cylinders and pumps, pick up and transport the loaded bodies to the crusher, where they are emptied by raising their tail-gates and are then returned to loading positions on the quarry floor. They are picked up, dumped, and set down automatically without manual assistance, all the operations being controlled from the cab of the truck by the driver. Normally 115 to 120 loads (a total of about 250 tons) are loaded and transported in an 8-hour day. Each man hand-loads about 4 tons per hour on a piece-work basis. Mr.



A composite view of the quarry showing drill and bucket-loader at left, plant in distance at right.

A load of stone being discharged to the primary crusher. Note how end-gate is released.

Milligan figures that it costs just about half as much to transport stone to the plant now as it did ten years ago when the old incline and cars were used. The bodies, or skips, are fabricated from steel plate largely by welding and the company hopes to manufacture and sell the system to other operators at some future date.

The plant's output is about 30 tons per hour, the greater part of the production being ½- and ¾-inch stone sold locally for road work. About 12,000 tons of dust and fine screenings is disposed of annually for agricultural use, none of the agstone receiving any special preparation, however.

The quarry is being worked on two levels at present, the driveways to the crusher house being easy grades which the trucks climb readily with their loaded detachable bodies. Two Loomis Clipper drills are used for the blast holes, small shots being detonated every few weeks during the operating season, which covers from 225 to 275 days each year.

This is the way the original rocker-equipped bodies looked in loading and discharge positions.

Instead of building up conventional storage piles, the company uses a section of the quarry for retaining surplus material. Trucks dump the finished materials over the edge of a 25- or 30-foot perpendicular face, from the bottom of which it is an easy matter to load the trucks with the aid of a Barber-Greene bucket-loader, access to the lower level being provided by a ramp. This storage method saves ground space which is at a premium, and at the same time is economical, since it makes a crane for building up piles unnecessary.

A small concrete-block plant is also operated to utilize waste and surplus sizes from the crushing plant. About 20,000 standard 8- by 8- by 16-inch units are produced annually. No other sizes or "specials" are manufactured.

Output of Building Lime Is Restricted

By ONLOOKER

The restriction of all types of construction, other than that of essential buildings, will have considerable bearing on lime consumption, especially on such lime as is produced and sold primarily for masonry and other building work. A survey of the manufacture and sale of lime products for this purpose brings forth some interesting, although ominous, facts which are set out for a bit of serious thought and meditation.

The table presented herewith has been compiled from yearly reports of the Bureau of Mines and represents a panorama covering the production and sale of lime for building use over a 20-year period. The figures shown include both quick and hydrated lime and the average value per ton is predicated on this basis.

Outstanding is the tremendous drop in the sales of lime for this purpose. From the middle "twenties," when over 2,000,000 tons was sold, representing 53 per cent of the total volume of lime marketed and at an average value of $10.61 per ton, the output declined steadily through the ensuing years to only 171.5 per cent. of the total volume sold during 1941 at an average value of $8.69 per ton. Depression years account for part of the reduced tonnage, as well as other factors influencing sales.

The tonnage increased from the low years of 1932 to 1934, due to the expansion of general building activities, but, contrary to expectations, the percentage of the total production has declined perceptibly in so far as building lime is concerned. In recent years and currently the heavy demand for lime for industrial and chemical purposes might be considered the main reason for the more than 50 per cent. reduction in building-lime sales, especially where certain limes may be interchangeable for both purposes. However, this is not borne out by the record of the total tonnage produced and, too, the large amount of construction work evident during the past several years would tend to bring about a larger percentage of lime sold for building purposes, provided the market was amenable to such action.

Assuming that this opportunity to increase the sales of building lime was present during the past several years—1939 to 1941 indicates this—how can we account for only 21 per cent. of the total production for the year 1940 having been sold for this purpose? Is it due to lax salesmanship?—failure to evaluate lime properly, or competition of other materials? It probably is a combination of all factors. The answer should be found in research of a technical nature as well as marketing analysis.

The cessation of building, except for defense housing and essential plant construction, will bring about a further curtailment in the demand for building lime, and competing materials will continue as an outside influence acting adversely on lime production. It would be wise and timely for all lime manufacturers to take stock of present conditions and possible future trends and to lay immediate plans to recapture the building-lime tonnage which is rapidly being swept away.

SALES OF BUILDING LIME—QUICK AND HYDRATED—1921-1941

Year	Short Tons	Percentage of Total Sales All Lime	Average Value Per Ton
1941	1,065,599	17.5	$ 8.69
1940	1,010,435	20.7	8.45
1939	1,000,498	23.5	8.56
1938	854,461	25.5	8.38
1937	948,553	23.0	8.66
1936	891,267	23.8	8.72
1935	656,894	21.9	8.70
1934	511,419	21.3	8.33
1933	533,088	23.5	7.18
1932	596,825	30.4	6.45
1931	947,085	35.0	7.33
1930	1,204,614	37.6	8.34
1929	1,640,827	38.4	8.72
1928	1,986,465	44.6	8.91
1927	2,148,840	48.7	9.76
1926	2,390,323	50.9	10.01
1925	2,387,267	52.1	10.10
1924	2,169,700	53.3	10.61
1923	2,131,533	52.3	10.57
1922	1,845,208	50.7	10.01
1921	1,239,486	49.0	10.70

Control Problems in Lime Manufacture

By **WOLF G. BAUER,** Ceramic Engineer

● Quality control in lime manufacture is a problem even in large plants. In small and medium-sized plants it presents special difficulties which the author discusses from a practical standpoint. The raw-rock supply, the calcination phase, milling, lime-sampling technique are fully dealt with and the applicability and advantages of control properly emphasized.

Introduction. As the scale of manufacturing processes increased from its early stages of the workshop to that of continuous processing by machinery in large plants, the need of establishing standards and scales to measure product, quality, and uniformity has become increasingly greater. With it came closer supervision and the partial elimination of the variables affecting the products. Control has, therefore, been forced on the lime plant by stricter specifications, keener competition, and greater diversification of lime markets and application in chemical industries. In many instances this has brought on half-measures and attempts at control which, in the final analyses, did not truly represent a control of product but simply a check of lime products as they left the plant.

We are here mainly concerned with the control aspects of small and medium-sized lime plants, as these are often supplying markets in direct competition with the usually better-controlled large plants and must, therefore, produce quality and uniformity of equal or better degree, with less personnel and equipment, all other factors remaining the same. In our present war period, when much lime is and will be pooled from many plants for use by one consumer, understanding of control and its successful application is paramount. No one single plant will need to take up all the points or phases of control mentioned in this paper, but rather should become aware of their existence in time of need, and apply control principles in logical and effective sequence to solve the problem.

The word "control" is an ambiguous term when applied to processing and product quality. Since there can be many degrees of control, there are also many concepts of control; and control systems evolved and applied to lime plants do not lend themselves readily to comparison for this reason. We must, therefore, treat the subject as a separate and fundamental science or art, sketching first its general outline, and then shaping it to conform to our particular lime operation and requirements.

By definition "to control" is to exercise a restraining, regulating, and directing influence on a particular object or process. There are many kinds of control exercised, from the president down to each foreman and shift boss, but in this treatise we are only dealing with a control system set up to regulate product quality. This, however, does not mean that the foreman and superintendent are not tied in as necessary links, or that we ignore the human factor present in all stages of manufacture. On the contrary, the control system represents much more than taking daily or weekly samples and making analyses in a laboratory. It is a carefully planned and worked-out program, representing the integration of many control phases to deal with our particular problem. It must be more than a policy or a daily report on lime shipments. It must become a tool for management.

In setting up a control system we must keep in mind its main purposes, namely: uniformity, quality improvement by correct interpretation of analyses, higher efficiency through less waste, elimination of unnecessary steps, sales points for promotion, tracing and elimination of complaints, and establishment of a basis for intelligent planning for future markets and plant development. Improvement in qualities and uniformity are the reasons for setting up a control system; the other advantages are direct results of its operation.

Quality is an elastic term and is used in a relative sense. Certain chemical ingredients must be held below or above specified levels. In other instances the degree of calcination or hydration may be the only issue. Physical characteristics for certain process requirements, fineness, particle-size distribution, particle shape, or any one of a hundred other qualities may be paramount and in need of control. Much is dependent on the consumer's viewpoint and emphasis. More can be done by studying the process in which the lime is used and then coming to a definite agreement as to allowable limits for the particular lime.

Uniformity is also a relative term, relative to different lime plants or different consumers of the same product. Often the nature of the deposit, the fuel, seasonal changes, storage conditions, blending methods, and the human element superimpose additional variables upon those already present in the average daily operational results. In such cases engineering application may not always suffice, and statistical methods must be resorted to in order to forecast values of a cyclic nature and indeterminate character.

Many lime operations owe their existence to a uniform and high-quality deposit, while others owe it to strict control alone. But many plants also furnish lime that just reaches specifications and no more; and, with the ever-widening applications of lime, there is hardly a plant operator who does not have some worries about its quality and uniformity in one or more particular consumer fields.

A large number of medium-size plants operate a laboratory and employ a chemist to check lime shipments. But because of a few tests on availability, ignition loss, or any specific impurity that must be continually watched, the laboratory is often considered a necessary evil. A surprising number of plants operate without a plant laboratory or chemist, periodically sending grab samples to some outside laboratory when complaints, plant changes, or

new consumers make a report necessary. In many plants, where chemists or analysts are employed, a good deal of the individual's time is spent making chemical analyses that include not only constituents which have little value from the control standpoint, but also are carried out to accuracies far in excess of those used in sampling, making the value of the analyses rather questionable and misleading.

Money spent on a laboratory without a proportionate amount allocated to the machinery necessary to the special technique of sampling lime is certainly putting the cart before the horse. It is one of the reasons why so many plants have no control or understanding of their product and its variables. Analyzing a sample brought in by a foreman or worker or other untrained person for the purpose of control is like attempting to correct a condition by changing two variables simultaneously. Analyses that come back to the plant days and even weeks after they were taken are usually of little help in the control picture. Ignition-loss values of limes and hydrates are of little help to superintendents or executives of smaller plants when these are not broken down into constituents, such as SO_3, mechanical H_2O, chemical H_2O, and CO_2. Numerical values of the nonvolatile constituents should always be reduced or increased to a standardized basis of certain ignition-loss value for comparison and control purposes and should always accompany the actual proportions as found.

There are many types of lime plants, and sometimes the cost of instituting and operating a satisfactory control is out of all proportion to the manufacturing costs. But as indicated earlier in this paper, the control system of one plant can not be applied to another; nor can costs be compared. But, aside from those blessed operations where rock and lime approach high purities, some sort of control system is necessary.

In order to avoid repetition, let us assume that we must work out control over all the possible and theoretical variables found in lime plants. First, we should have unified command, and the chemist must, if time allows, handle the whole machinery himself. This, however, is not always possible.

Control is carried out through five methods:

(1) Process and personnel supervision,

(2) Instrument control and records,

(3) Sampling and analysis,

(4) Statistical graphing and recording, and

(5) Laboratory accounting and reports.

Points of control are broadly fixed at the several manufacturing stages of quarrying, firing, hydrating, milling, batching, storing, and shipping. From these five methods applied at the aforementioned points or stages of manufacture, the chemist, engineer, or executive responsible for the product quality must constantly interpret the conditions and variables affecting his products and make corrections in time to be effective. For the purpose of presenting a complete picture of the specific problems that may arise, we shall apply these methods to all points, and discuss the difference in technique and equipment of the small and the larger operation.

Raw-Rock Supply Phase. In the quarry or mine we find many variations. We should map our deposit and establish locations of working faces and levels in respect to permanent reference points. Such points can be established by drilling holes in the quarry floor at regular intervals and in definite alignment and driving iron stakes or drill steel nearly flush with the surface. An attempt should be made by means of inference, measurement, and drilling records to draw to scale certain cross-sections or elevation planes through our deposit, preferably parallel or in line with the direction of operations into the ore. In small plants this can be paced off and elevations taken with tape and level. In larger workings the alidade or plane-table and stadia measurements can be used, or a surveyor can be hired to make the initial maps which form the basis for records and development planning.

In larger operations the services of a geologist should be engaged for a few days to spot geologic features on this map, and the quarry foreman and plant chemist or engineer should make themselves familiar with these, in order to plan development and accomplish selective quarrying, if need be. In many deposits of flat-lying beds we have uniform conditions both as to lateral and vertical extent. But more often we find not only beds with different chemical or physical characteristics, but also deposits composed of folded strata cut by faults and intrusions. In such cases it is absolutely essential to employ accurate contour maps and cross-sections showing geologic structure, continually entering or changing geologic features as they appear, keeping records of analyses as the working faces advance. After a few years of maintaining records of this type of quarry or mining progress employing a yearly check with the geologist, such running records kept up-to-date will tend to bring these initial variables under intelligent control. Not only should chemical analyses be recorded, but also changes in the behavior characteristics of the rock in subsequent calcinations, hydrations, and job applications noted.

In all this systematic analysis it should be kept in mind that the more successfully we can exercise control in the initial stages of manufacture, the simpler will the control work become farther down the line. In tracing trouble back to its source such records are invaluable. We must be able to bring the delinquent lime to trial and depend on our police record to produce witnesses that explain the circumstances responsible for the quality drop. Variables in the quarry can spring from indiscriminate mixing of changeable rock, lack of foresight in keeping ahead of demand, lack of supervision in breaking to the best size, and contaminations due to seasonal changes or stripping. Soon the individual in charge of control will eliminate non-essentials and simplify his records, learning to turn his attention and effort to the elimination of the chief troublemakers.

Sampling, as pointed out earlier, is a fine art. In the quarry or mine, however, the collection of representative samples is not as difficult as sampling lime, which often requires specialized methods. Once the deposit has been graded as to rock quality and the boundaries are established, the sampling will be governed by the quarrying method. Mixing, alternate blasting and breaking, separation through stock-piling, subsequent blending or washing—all have a bearing on sampling points and methods.

It is much more valuable to spend several hours at sampling and run one analysis, possibly for only one or two ingredients, than to collect several indiscriminate samples and analyze them carefully and accurately. It is not the number of analyses or the time spent in the laboratory that counts; it is the intelligent planning of where to take the sample to arrive at a certain conclusion, and how representative that sample really is.

If we have a quarry face made up of nearly flat-lying beds of different

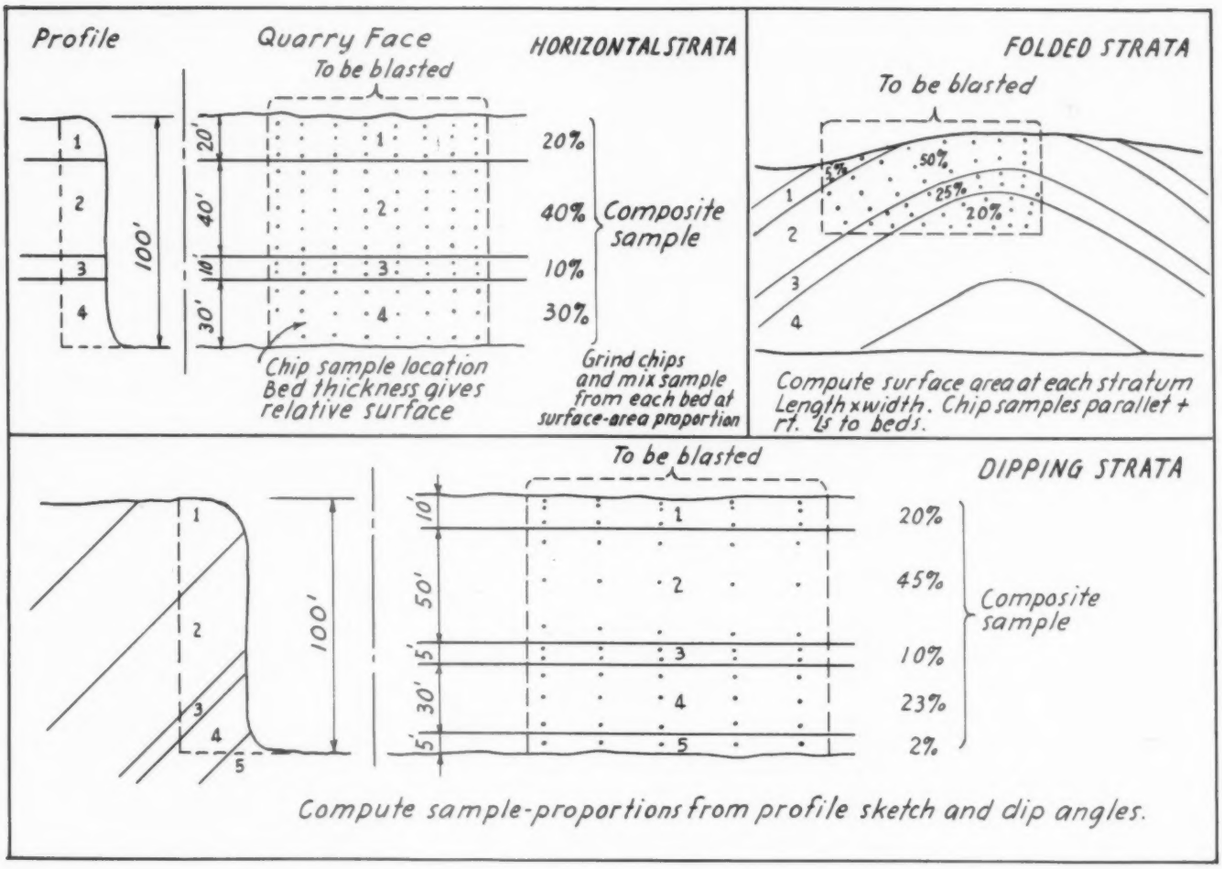


Figure 1. Methods of sampling from various strata.

thicknesses and slight variations in analysis, and all this is mixed before going to the plant, it will not do to take samples from the blasted and broken-down rock pile. Nor will it do to take samples along or up and down the face at regular intervals. In such instances we must take some measurements and find the exposed surface proportions of the several beds, use regular intervals of sampling points within each stratum, grind and thoroughly mix these portions, and then combine them into a composite sample by weight according to the surface proportion of the exposed face. After this is done the usual process of mixing, quartering, and further particle-size reduction by grinding is followed.

If our beds are dipping, we must carefully determine the lateral and vertical boundaries of a particular section to be blasted. In order to use such data to advantage, we must hold sampling variables to the absolute minimum. This is prerequisite. Often rock is hauled from several quarries or faces and beds to a central distributing point, and the proportions of rock from these sources vary from time to time. In many such instances, however, it would not be necessary to sample such mixtures each time as long as we have accurate and up-to-date original source-analyses and keep records of the proportions by car or truck count. The analysis of the mixed plant input or shipment can often be computed more accurately in that way than by the more common method of sampling the batch itself.

Confidence in such methods and short cuts come only with conscientious and planned sampling. In all cases experience makes it highly advisable that the individual making the analysis and interpreting the results should also collect and prepare the samples. We shall deal more specifically with sampling problems farther along when discussing lime. The illustrations (Figure 1) show in a rough way how a representative sample would be collected from a hypothetical face. A rope and ladder may have to be used, but it is all part of the work and must be mastered. For statistical purposes and control check it is also necessary periodically to sample each bed individually and compare with the usual composite samples by mathematical computation of surface proportion.

In smaller and limited quarries or mines the quarry foreman may be trained to do this job. In operations where rock-quality control is a serious matter the foreman should be kept thoroughly familiar with the location of samples, their analyses, and the results obtained with the lime made from them. In many quarries rock of certain undesirable characteristics can be recognized visually by the trained observer, usually the quarry foreman or powder man. In such instances control can be achieved through the coöperation of such individuals. It is good to train one or more persons to recognize such rock as a precautionary measure and also acquaint these individuals with any changes in analyses that can not be detected by the usual inspection.

Regardless of the size of the operation, we need a few basic tools to collect and prepare samples for analysis. A hammer with a well-tempered and pointed pick on one end is needed for taking chip samples, the hammer head being used to trim them to size (Figure 2). A riffle box

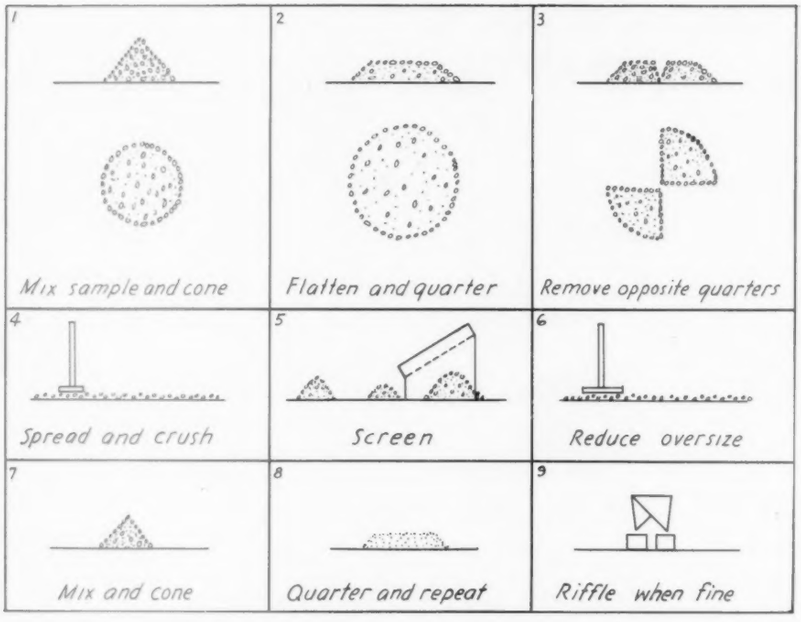


Figure 2. Nine steps in the preparation of samples.

or "Jones sampler" can be made up in the shop, along with a receiving pan and scoop (Figure 3). Sample bags or jars with label cards should be available. There remains only the acquisition of a large steel mortar and pestle for grinding the sample and a few hand sieves to keep the reduction process to definite limits. Larger plants will use a small laboratory crusher to prepare the sample. A small pan balance reading to one-tenth ounce is sufficient. If necessary, the sample can be apportioned and mixed by volume without the use of a scale.

In the smaller plants we must be extremely practical to the point of innovation. It may take an outside laboratory to make the initial analyses and establish the nature of the most troublesome ingredients, but it does not necessarily take a trained chemist or laboratory to run daily plant tests.

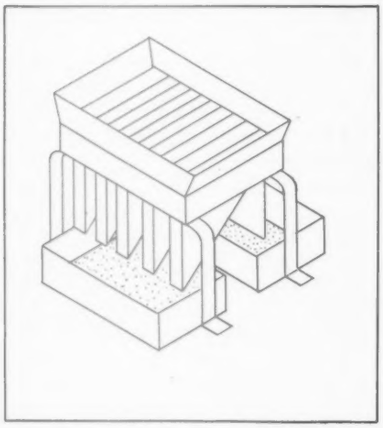


Figure 3. Sketch of riffle. Each chute should be at least four times as wide as the largest particle.

For instance, it may be established that a certain rock stratum or quarry face contains streaks of high silica or insoluble content and that an increase in this also increases the troublemaking element. We can establish, therefore, a relation and indirect yardstick for the impurity in question.

Accurate chemical analysis may further establish definite relationships between total lime-carbonate content and obectionable constituents. The writer has instigated control tests from such relationships that can be easily and quickly made by the foreman, superintendent or worker right in the plant.

It is to be kept in mind that accuracy is a proportion or percentage relationship. It is immaterial if we use a fine chemical balance and work with 1- or ½-gram samples, or if we use a store or rough pan balance and work with 5- or 1-ounce samples. If insoluble matter is to be determined, it might be considerably cheaper to use a simple $15 balance and a pint of commercial muriatic acid for each determination than to send the sample away to be analyzed and get the results a week or more later.

If we want to get a check on the total lime oxide of the rock, it is a simple matter to use a blow torch and a few high-temperature insulating bricks and clamp together a small furnace to run ignition tests. For makeshift work the writer has even used a shelf in a poke hole in the hot zone of the kiln or a special crack left in the brickwork where samples can be placed in a clay crucible and quickly placed in position close to the hot lining.

Such tests need not be time-consuming at all. The time is chiefly spent in getting and preparing the sample and in weighing before and after the test. Often a volume comparison of impurities can be made that is sufficient for the purpose.

There are many other relationships that can simplify control work. In larger operations equipped with well-planned laboratories specific gravity, porosity, mineral-separation methods, rock thin-sections, etc., all might enter the picture as a link in the control system of the raw rock supply stage.

Calcination Phase. The next control stage covers the calcination process. Here many more variables enter the picture. All our control tools are brought into play—process and personnel supervision, instrument control and recording, sampling and analyses, statistical collections and graphing, and orderly laboratory accounting methods.

No doubt the lime-kiln fireman is the most individualistic worker in a lime plant, and our theoretically all-embracing control system must even consider psychology as a means to an end. This is a definite problem or condition to be brought under control, the importance of which is seldom recognized by management. For our present purpose kiln operators might be classified into three groups.

There is the veteran who holds to his old traditional ways and fires by instinct. He has pretty much his own way in the older plants and can be trusted to burn good lime as long as no experimental changes are made or he is not forced to be governed by instruments. Such men must be handled with kid gloves to fit them into the more scientific control and kiln arrangement necessitated by present-day consumer demands.

Then there is the younger man with relatively little experience. He does not rely as closely on "instinct" and takes the older man's work and experience at their face value. It is relatively easy to hold him to a schedule and put some reliance in instruments, as he has greater interest and capacity to interpret conditions and learn.

The third type represents the intermediate personality, not particu-

larly bright, performing the job automatically without much reasoning and usually lost when things go wrong.

To integrate all such men into a well-functioning team is a real job and study, and sometimes only very drastic changes will bring results and eliminate this ever-present variable in lime burning.

Two mutually coöperative firemen, each on successive 12-hour shifts, were a great advantage in the past over 3- or 4-shift operation, where variables introduced through additional operators increase the difficulties of interpreting and correcting of kiln conditions.

Jealousy, imagined hurts, disagreement as to kiln management, and personal preferences, all detract from efficiency and complicate control. There is no other stage in lime manufacture where personnel coöperation is of more critical importance. As in all personnel management, inherent traits of pride and competitive spirit should be encouraged and exploited.

In some operations it is often quite simple to make quick daily tests for one particular property of the lime, which will be indicative of correct burning conditions. Such tests as settling or slaking rates, or the residue after slaking, are good criteria in evaluating the degree of burning. The daily results of such a test can be posted on the firing floor or kiln-instrument board. Free moisture or the percentage of rejects from a beater mill can be used as an operational guide for hydrator men. In such cases a relationship between the analysis of hydrator feed and discharge can be used.

There are many ways to solve such conditions, depending on the circumstances. A careful study and regrouping of firemen is often necessary. In some plants head firemen are appointed and made responsible, one on each shift, or one spending some time with all.

Instrumentation is both a control and a tool for control. We must here differentiate between indicating and recording instruments and point out their value and limits. Indicators are designed to function as a help and yardstick for the operator controlling the process, whereas recording instruments further act as a check and review of the operator's ability to hold process conditions within certain limits. They are, therefore, a check on operator performance. Here, again, the control system must attempt to establish a relationship and correlation between the process conditions and the operator's work. However, when recording instruments can not be made available, there are methods to use the indicating type for such purposes. Mimeographed report forms or cards can be filled out and hourly entries from the instruments made. It is especially wise to have the operator coming on shift make out such a report of conditions as he finds them and in the presence of the man going off shift. In this way the men not only check up on each other, but also do their utmost to have things in good shape to show up well on the next man's report.

It is not the object here to go into details of kiln management. However, if we employ instruments, we must use them not only as operating aids but also use their records or the reports of their readings as a statistical link in our control system.

More and more plants are using draft gages, pyrometers, flow meters, and controllers in burning lime. Due to the fact that most plants are now pushing kiln output to the limit and also because specifications are becoming stricter, operators who have used simple indicating and recording instruments are supplementing them with automatic controllers. In other words, the measuring units shift the control point of the controlling units which, by air motors or solenoids, relay these values proportionately to the points under control, actuating valves, dampers or feeders, starting or stopping fans, fuel or feed, or causing alarm signals to be set off for the attention of the operator.

It is good to remember, however, that the controlling instrument is only a means to an end. It is also true that certain lime-kiln operations are difficult to bring under automatic control. Yet, on the other hand, we find many plants which have invested in measuring and controlling instruments, but still find themselves as dependent on the human element as before, simply because the instruments are not arranged effectively or in logical sequence, or their potential value is not realized because only the operator makes use of them.

Here, again, the more variables we can eliminate at the initial stages of the process, the less trouble we have holding later stages within limits. Fuel and rock are the starting points here. Uniformly sized, clean rock, segregated for burning characteristics if necessary, and supplied to the kiln pre-heater and storage at regular intervals are points to be controlled. Coal of uniform analysis and size; oil, natural gas and air at constant temperatures or pressures; wood of uniform moisture content, size and species; producer gas within narrow limits of temperature and composition; and powdered coal of even particle size, moisture and content, and blast-air-mix—all these must be controlled by manual or automatic adjustments, analyses and operating rules.

It is false security to depend on instruments at the kiln when these are indirectly controlled by an operator or a fuel supply not under control. In such instances the kiln operator is constantly battling to overcome variables introduced ahead of the line, keeping him always a step behind the kiln. The veteran lime burner anticipates his kiln conditions and makes corrections before they unbalance the kiln. Correcting a faulty condition after observing it means that the lime burner did not stay ahead of his kiln. It is apparent, therefore, that when three or more men must handle a kiln successively in a day, their success depends in a large measure on the constancy and uniform quality of the rock and fuel supply.

Besides supervision and instrumentation, the sampling of fuel, combustible and air mixtures, or kiln exhaust gases should be done periodically and whenever an operating change is made. It is, then, very important to tie in such data with the routine reports or charts and also with lime quality. To complete the picture an effort should be made to keep a full count of rock and fuel input and lime output. Weights should be used, but if volume measurements only are possible, they should be checked for weight now and then as particle-size variations affect the values.

Lime sorting immediately after calcination is frequently the most vital control point in the whole manufacturing process, for this is often the only place where certain mistakes and quality variations can be corrected. The writer knows of plants that would have been unable to operate at all except for the fact that they employed an exacting sorting method, in which lump lime from shaft kilns was sorted into five distinct grades according to quarry origin, degree of burning, and impurity-carrying fines screened out at the bottom of the cooler. Each grade was processed for a different application and became competitive, whereas mixing even two of the grades would have produced an inferior lime for the markets available to the plant.

In rotary-kiln plants hand sorting is impossible, and mechanical provi-

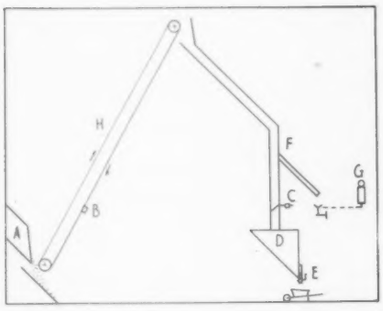


Figure 4. Continuous sampler for long periods and large samples. A, main discharge stream; B, sampling bucket; C, automatic air lock; D, air-tight sample bin; E, wheelbarrow to grinder; F, overflow chute; G, overflow alarm signal; H, slow single chain.

sions might be found necessary in some instances. Although rock is usually screened to narrow limits for rotary kilns, there are times when the rock is moist enough to cause considerable clay or dirt to adhere. Attrition in the kilns might make it necessary to screen these fines out, in order to maintain specification tolerances, and it is good to analyze these finer-size fractions periodically as a check on quarry contamination or determine the necessity of going to screens of larger opening during the wet season. Some plants use coarse screens to allow lime to pass through, yet retain larger pieces of clinker, scale, and brick fragments from the lining and ring formation in the rotary. Generally, the less control is employed or is possible to carry out in quarrying and calcining, the more painstaking must sorting become.

In exercising supervision and a check over the sorting operation in shaft-kiln plants the method of lime handling influences the procedure. Lime is usually sorted on picking belts, pan-conveyors, on the floor, or on pans under the cooler. The experience and conscientiousness of the sorter, the speed of the conveyor, the time allowed, the quality of the illumination, the depth and uniformity of the stream, the relative conveniences as to position and tools, the temperature of the lime, and the ability to check on the sorter's efficiency are factors that should be given serious study by the person in charge of quality control; as here is often the most lucrative point of attack from the standpoint of results.

In adopting a checking method on the sorting operation it is difficult to sample and analyze large batches of lump lime without making the sorter aware of it. It is also unsatisfactory to sample from storage bins due to segregation and the difficulty of checking back to a particular operator or shift crew. It is best to sample mechanically after the lime is crushed and before it goes to storage or the surge bins. Thus an undue amount of core, overburned or dirty lime can be traced to particular sorting or individuals, and also traced back to calcination history and even into the quarry. Here is the most logical place for a continuous mechanical sampler (Figure 4), for the simple reason that lower-quality batches can not only be traced back the easiest, but can also be forestalled or dealt with in the subsequent processing. A certain tolerance may have been established after the sample is collected and prepared, and so it may become a simple matter of running a slaking test on a screen or elutriation in a bottle supplied with running water to test dirt, overburned lime, and core. For such physical tests much larger samples can be used, thus speeding up sample reduction and achieving better average values.

Milling Phase. In the processing of lime and limestone drying, grinding, beating, screening, hydrating, air-separating, and blending are some of the stages in manufacture that may have to be subjected to rigid regulation. Sampling by batch or continuous and mechanical means might be necessary at some of these points. Whatever the degree of control exercised, it is of great value to complete the plant-control system by supplying at least periodic check-ups on the physical and chemical state of the lime or limestone before and after it passes through a certain processing stage. If this is done, the man in charge of control and all those concerned with its results will have a continuous physical and chemical flow-sheet of their manufacturing operation. In some plants this will be very simple and limited; in others, quite detailed and exacting. Aside from its control aspect, there will also result in each case more intelligent understanding, quicker interpretations, and higher process efficiency.

Superintendents and operators in charge usually know the quantities or rates of the streams coming from the feeders, hydrators, screens, separators, etc.; and some are also familiar with the screen analyses of these many streams. But only a small minority could draw up or even refer to a flow-sheet that would picture clearly what constituents are present and in what proportions, and how their percentages vary through the process.

We may have, for example, a sudden or steady increase of rejects from a beater mill fed from the hydrator discharge. In a high-calcium lime core may be easily recognized as such by color, whereas dolomitic core, containing as it does an intimate mixture of oxide and carbonate, is much less readily identifiable. The increase may be due to core, very hard-burned lime, or insufficient hydration time. This is reflected in similar measure in the quality of the hydrator output ahead, and that of the air-separator following the mill, and so, from the basis of previous records, adjustment can be made intelligently to all three units in order to affect the quality most favorably.

Often it is necessary to run a few hours on one stream of lime without interruption, as from hydrator feed to bagger. In such a case the rate of travel through each machine must first be established. Representative samples are then taken of the same original batch as it travels through the system, these are analyzed and entered on the flow-chart. This method very often will bring out wrong adjustments that are simple to correct.

Such a procedure of tracing a sample through is applicable all along the line of manufacture, and is well worth the trouble. The writer knows of one instance where a plant traced down an impurity which became predominant in a very narrow particle-size range. Changes in grinding time and impact force of the grinder, along with converting a double-deck screen to a triple-deck which removed 75 per cent. of this narrow-size band of deterimental material, beautifully illustrated the value of acquiring a running chemical flow-sheet of manufacture.

Many facts must slowly be gathered to make all the control as direct and time-saving as possible. Frequently it seems at first a simple matter to correlate the loss of mechanical water and the absorption of chemical water with the storage time of fresh hydrate in bins, or the water loss due to evaporation in grinding or conveying; but after samples are analyzed, however, they will not always show consistent values. Variables of humidity and temperature, uneven movement through differently shaped bins, and other factors can not be evaluated. In such cases it is good to refer back to the original contention that control ahead of the particular stage is more important than control efforts later to overcome variables introduced before.

Lime-Sampling Technique. The

success of the whole control system depends upon samples that are truly representative and allow correct interpretation. A sample is defined as: "A part of anything presented for inspection or shown as evidence of the quality of the whole". The sampling of lime presents unique problems that must be recognized as such and mastered. These problems owe their existence to two factors: the relation of hardness and specific gravity of the impure particles to the pure, and the chemical reactivity of the lime causing it to take on H_2O and CO_2 at all times at different rates. In these two respects lime is somewhat similar to coal, except that these factors are even more pronounced in the case of lime.

There are plants where the sacker will, during the course of a shift, collect a quart jar full of crushed lime to be sent away for analysis. In order to appreciate the folly of such practice let us draw some comparisons. Assuming that in this medium-size plant a shift produces 50 tons, our sample, weighing 2 pounds, represents 1/50,000th portion. Of this minute fraction the chemist used 1/2,000 part, making the sample a 1/100,000,000th part of the 8-hour output which it is to represent. It is evident that such a sample is simply "collected" but not prepared; also, that it is much too small in relation to the whole, and that the inclusion of each original size particle of core, slag, or brick, for example, could easily throw off the analysis by 1 per cent. from this one probability alone.

The general procedure of preparing a sample involves the setting aside of a fractional part of the well-mixed original amount, reducing the portion to a finer size, mixing and dividing again until, after several such cycles of operation, the sample is of a size to be analyzed. The correct method for quartering samples by shovel (Figure 2) and riffle (Figure 3) is given in numerous coal and ore-dressing books and need not be elaborated here further, except to stress the importance of air-tight containers and speed in carrying out the preparations. The underlying principle in such a reduction process is the strict need of holding the weight or size of the sample to a certain ratio of that of the largest particle. Depending on the accuracy to be used in the analysis, the size of the largest particle should be such that the addition of one such particle will not change the average composition of the mixture by more than the limits to be adhered to in the analysis. For purpose of illustration the proportions generally used in coal sampling are given in Table I.

TABLE II—PERCENTAGE ABSORPTION 10-MESH HIGH-CALCIUM

Exposure in minutes	0	20	40	60	80	180	1,440
Loss on ignition	1.7	2.8	3.5	4.1	4.3	5.5	18.4
Absorption	0.0	1.1	1.8	2.4	2.6	3.8	16.7
Carbon dioxide	1.3	...	...	...	...	...	4.0
Water	0.4	...	...	...	...	...	12.7

TABLE I—PROPORTIONS USED IN COAL SAMPLING

Weight of Sample to Be Divided	Largest Size Before Division
1,000 pounds	1-inch
500 pounds	¾-inch
350 pounds	½-inch
125 pounds	⅜-inch
60 pounds	¼-inch
30 pounds	$\frac{3}{16}$-inch or 4-mesh

Samples to be tested for unslaked residue, such as are taken for sorting control, might fall in the range of Table I and can be tamped and crushed to 4-mesh on the plant floor and shoveled through a sand screen. In larger plants a small jaw or gyratory crusher will work the sample down to ¼ or ⅛ inch. From this size down to 20-mesh rolls or a coffee-mill type grinder are used, and a pulverizer or hand mortar and pestle for the 20- to 60-mesh fractions allows quartering and mixing down to samples for chemical analysis. The adopted ratio of sizes is determined by the grinding methods. Some plants tamp the sample down to ¼ inch by hand and then use a disk grinder and screen as the only power operation.

Core and overburned lime have a tendency to remain in the larger and still unground pieces above 20-mesh, whereas quarry and kiln grit often predominate in the larger sizes of the sample below 20-mesh. Such hard-to-grind impurities have a further detrimental effect due to their higher specific gravity. It is, therefore, very essential in lime-sample preparation that such harder and denser particles are ground down sufficiently fine and well mixed prior to further reduction.

The next characteristic that influences the technique of lime-sample preparation is the tendency of the lime to increase in weight on exposure. When samples of several hundred pounds are prepared in the plant by hand methods, and the cycle of screening, grinding and dividing is repeated many times with variations in exposure, degree of burning, fineness, and humidity of surrounding air, considerable error can be introduced. Table II shows the increase in weight of a sample of lime passing through 10-mesh and spread out ¼ inch thick on the laboratory table at 69 degrees F., and 59 per cent. relative humidity. Carbon dioxide and total water were determined on the fresh sample, and after twenty-four hours exposure. Figure 5 shows this one particular curve. The fact that H_2O is picked

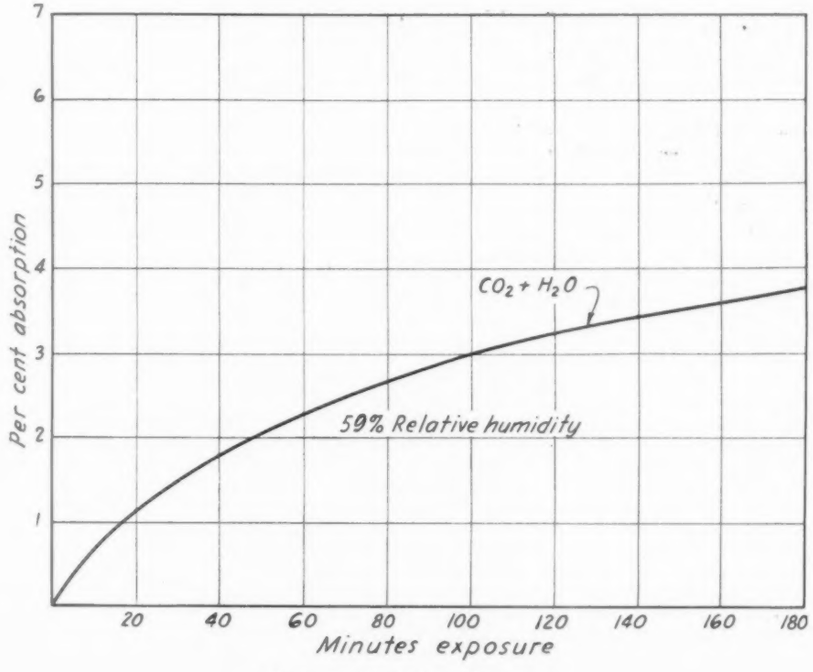


Figure 5. Total absorption curve.

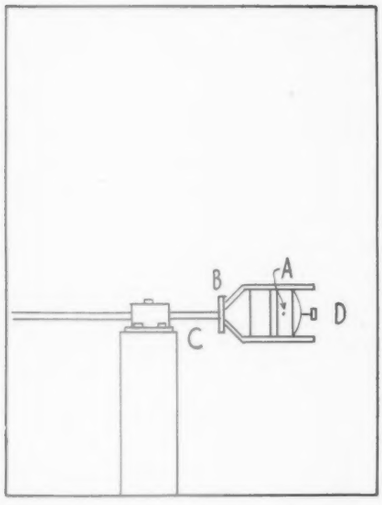


Figure 6. Grinder and mixer for laboratory samples. A, mill frame; B, disk welded to shaft; C, slow-speed shaft; D, pebble mill or mix jar.

up at a higher rate than CO_2 would indicate that the relative humidity during preparation can be of considerable influence, and that humid or foggy weather can cause the finest particles of very soft-burned and reactive lime fresh from the kilns to pick up considerable weight.

No two limes would show the same curve. However, it is quite possible to standardize or at least evaluate the conditions under which the whole sampling process is carried out, and then apply a correction factor without making further determinations, when checking samples sent out to other laboratories. Such a sampling-correction factor was derived by the writer in a plant where part of the samples were sent away for more accurate analyses of certain constituents, and where it was important at the plant to differentiate beween CO_2 from core and from absorption. The sampling factor varies with each sample and is derived from a curve showing the absorption rate of lime under standard conditions of grinding, sample preparation, fineness, humidity, and exposure.

$$K = \frac{100 - (I - f)}{100 - I}$$

where K = constant applied to the sample analysis
f = sampling factor (from curve)
I = percentage loss on ignition

In large operations it should be possible, however, to cut down the time of preparing large samples to a safe minimum and control this process for uniform results.

There are many ways for the smaller plant to set up the simple machinery and tools for accurate sampling. If hand crushing is employed down to 4-mesh, it is a simple matter to weld together small shaker screen, tamper, riffle boxes and pans, and provide a frame on some slow-turning projecting shaft in the plant to fit a gallon jar for mixing or a porcelain jar with pebbles for fine grinding (Figure 6). Riffles of two sizes should be made, one for the ¼-inch size and one for the 10-mesh laboratory, from which hydrate and finer products are sampled. All pans and containers should have air-tight covers, or be fitted with funnel hoppers provided with air-locks.

Continuous samplers placed at strategic points take many forms. There are small containers moving horizontally on an arm fastened to a vertical shaft, passing under a discharge stream with each revolution. This type cuts across the width of the whole stream, and as long as the container has passed through the stream without overflowing, the sample should be quite representative. There are also scoop feeders on vertical wheels or arms scooping across a moving stream; chains with a single scoop fastened to them and catching a sample by passing through a continuous discharge (Figure 4); small cross screw-conveyors taking out continuous samples or by-passing their full load except for periodic diversions to a sampling can; revolving cones with flared sampling hoppers or slow-turning deflection disks with sampling slits. Samples can be taken either continuously from a portion of a moving stream, or periodically from the full stream at short intervals. The latter practice is usually preferred for the reason that conveyors do not carry their load distributed evenly in size through their cross-section; nor is there size-uniformity in sliding or falling discharge streams. Periodic samplers, taking the whole stream at certain intervals, can be geared best to slow-moving cams connected to ratchet wheels and lifters. Electric time signals and controllers are sometimes used to start or stop small motors in the system. It is also a good idea to provide the receiving container with an air-lock gate that opens due to the weight of the batch and closes by counter-weight afterwards. Containers connected directly to a continuous sampler should also be made air-tight (Figure 7).

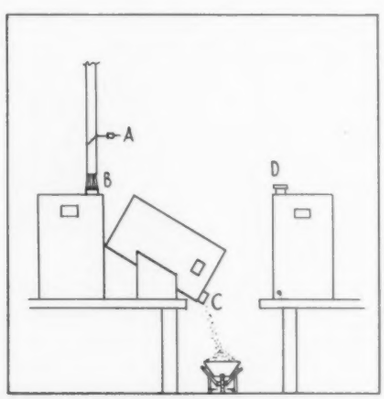


Figure 7. For special or smaller samples. A, air-lock and stationary pipe; B, inner-tube air seal; C, 6-inch short nipple spout; D, 6-inch cap for storage seal.

Not for the purpose of control but for periodic check in respect to specifications, and for use in sales promotion, advertising, quotations, and reports, analyses of the various finished products are made. Sampling here depends upon whether a shipment is in bulk or in bags. Pulverized or hydrated lime is sampled according to A. S. T. M. or federal specifications. Sampling tubes may be employed in obtaining vertical cross-sections of the contents of definitely-spaced bags as the shipment is being loaded. If the product is in powder form, only repeated quartering and mixing become necessary to prepare the sample for analysis. To inspect bulk shipments of crushed lime the sampler must keep in mind the uneven distribution of large and small particles when dumped in the form of conical piles or ridges in railroad cars. If the cars are already filled, grab samples can be collected at regular intervals over the entire surface and at some depth from the surface. If mechanical car-loaders are used, it is best to have the attendant collect periodic samples from the discharge end.

Control Accounting. Although the writer has coined this expression, control accounting, its meaning and implication should be self-evident. It represents probably the most important phase of the control system and the final integration of data from the several control points. It is by far the most difficult part of the job, requiring patience, a sense of proportion, much thought and organizing ability. Here the engineer's, as well as the statistician's and accountant's, approach must be employed.

It is true, and especially so in smaller plants, that chemists have little time for statistical and accounting work. However, that is exactly the point. Shipment and check analyses are not control analyses. The latter are usually of a relative nature

and can not be used for outside reports. What is done is done, and the person operating a control system will spend only the most necessary time and money on testing finished products. Such testing is simply inspection and, although frequently necessary, is not control, as designated so erroneously by many. Prevention is better than cure, and control work for quality and uniformity concerns itself with the elimination of the variables that now make finished-product inspection seem necessary.

Although accounting principles have undergone little change, accounting methods and techniques have been streamlined to serve modern business needs. The shift has been from the simple accumulation of facts and figures of past transactions to the use of accounts for current control. Accounting has become a tool by the use of more expeditious methods in furnishing monthly or even weekly and daily information through continuous records. Such current data lend themselves to analysis and constant comparisons against trends and arbitrary yardsticks taken from statistical records. In lime-quality control accounting it is exceedingly important to adopt such methods, not only for better understanding by management, but also as an orderly and systematic tool for the individual using it.

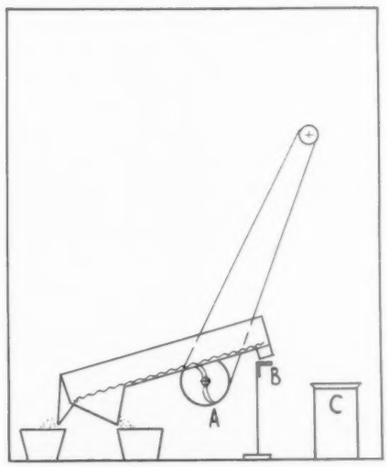


Figure 8. Small impact screen for preparing large samples. A, double cam to lift screen; B, adjustable impact block; C, air-tight cans for fines, used during grinding and quartering.

The technically-trained person is not as apt to use statistical methods as the trained office manager for the reason that statistics make use of assumptions and (as they appear to the scientific mind) methods that do not follow known laws and through which results can not be predicted with unfailing accuracy. Nevertheless, they have their place in the control set-up, and the care and intelligence with which records are kept and correlated with others will have considerable bearing on the success with which variables of a cyclic or indeterminate nature are eliminated.

The statistical approach considers all angles. It reasons: What good are instruments when their recorded data can not immediately be interpreted in the light of former results? What good is supervision if, in establishing the fact that there are variations in quality, it does not also indicate the means of finding and eliminating the cause of the unexpected? What good are tests when one does not know if variations are due to chance or to basic differences?

A control-accounting set-up does not imply the construction of countless charts, graphs, tabulations, and long-winded reports, but rather the standardization by mimeographed forms of collected data, and the transformation into charts, graphs, or flow-sheet form of such conclusive computations and interpretations as can be used as true indices of manufacturing conditions by others than the control supervisor himself. Specifically, it means evolving mimeographed forms both for the collection of information in the quarry and the plant and also for entering integrated and translated data for statistical information and control use.

There are many obstacles in the way of setting up a definite and thorough system that will operate successfully. Many data must be collected, short cuts and improvised techniques of sampling and testing evolved, and personnel trained. No matter how small or large the operations, however, there can be no half-way measures in principle, and the purpose of this paper was only to touch upon some of the many problems involved and distinguish between a "control system" and so-called control by finished-product inspection. It was not the intent to present instruction or specific problems, but rather to paint a generalized picture of principles and methods that can be used as a guide by lime-plant management.

Remember Pearl Harbor . . . . . .
Buy War Stamps and Bonds

Curtailed Road Work to Stimulate Bond Payment

Savings effected through the curtailment of new highway construction for the duration of the war will enable many of the 41 states having highway bonds outstanding to accumulate funds to pay off their highway bonded indebtedness and thereby comply with the seventh point in President Roosevelt's inflation control program as enunciated in his Labor Day address to Congress. The President declared that "we must discourage credit and installment buying, and encourage the paying off of debts, mortgages, and other obligations."

Figures compiled by the American Association of State Highway Officials show a totaled bonded indebtedness for roads and bridges under state control of $1,803,979,448 as of January 1, 1942. Normal maturity of these bonds ranges all the way from 1944 in Connecticut to 1979 in Delaware.

Highway construction by the states in normal times of peace amounts to about $500,000,000 a year, but since the United States became a participant in the war all highway construction has been halted except for roads of strategic military importance.

Offset against the savings in highway construction are the reduction in highway revenue resulting from rationing, the curtailment of new automobile production, and other wartime restrictions in motor travel.

Prior to the war highway bond service was taking a substantial slice out of gasoline-tax revenues in many of the states. In Arkansas highway-bond service absorbed 73 per cent. of the state's share of the gasoline tax. In Florida it absorbed more than 40 per cent., in Iowa 44 per cent., in Louisiana 65.8 per cent., in Mississippi 51.6 per cent., in Missouri nearly 38 per cent., in New Mexico 41 per cent., in Tennessee over 43 per cent., in West Virginia 44 per cent., and in other states substantial proportions.

With state gasoline-tax revenues curtailed by the war, bond service will require an even larger proportion of gasoline-tax receipts. The use of all savings effected through the stoppage of new construction, as well as other surplus highway funds, to pay off outstanding highway bonds, however, is being used by eight states to strengthen the financial status of their bonds. These states include: Iowa, Maine, Minnesota, Missouri, Montana, New Mexico, Oregon, Tennessee, and West Virginia.

PERSONAL MENTION

V. P. AHEARN, executive secretary of the National Sand and Gravel Association, Washington, was elected president of the American Trade Association Executives at its 23rd annual convention, held November 5-6 at the Hotel Pennsylvania, New York.

E. B. MITCHELL, JR., has been appointed division sales manager at Dallas by the Lone Star Cement Corporation, succeeding J. BRYAN OLDHAM who has been transferred to New York City where he becomes general sales manager for the company. The Dallas offices have also been moved to the First National Bank Building. PRATHER H. BROWN has also been appointed assistant division sales manager at Houston.

JOHN E. BOYD, formerly chief chemist of United Feldspar & Minerals Corporation at Spruce Pine, North Carolina, has been promoted to director of research and development. S. G. WISEMAN, formerly assistant chemist, has been made chief chemist of the Minpro Division.

ROBERT H. MORSE, JR., who has been branch manager of Fairbanks, Morse & Company's offices in Cincinnati, Dallas, and Boston, has recently been appointed assistant sales manager. JOHN ELMBURG replaces Mr. Morse as manager of the Boston branch.

J. W. ADAMS of Meridian, Mississippi, has moved his equipment west of Shuqualak and will begin mining bauxite. The deposit is on the Flore holdings.

WALTER G. PENRY, head of the Penry Stone Company and the Penry Sand & Gravel Company, Radnor, Ohio, was elected president of the Ohio Elks' Association at its recent meeting held at Cedar Point.

GEORGE L. RANDALL, advertising manager of the Wickwire Spencer Steel Company, New York City, has been promoted to public-relations manager. He will continue in charge of the company's advertising.

BRUCE GREGORY, formerly in charge of sales of the Thornton Tandem Company, Detroit, has been made a vice-president in charge of sales and a member of the board of directors.

E. T. GREEN, until recently in charge of safety work at Shasta Dam in California, has joined the staff of Basic Magnesium, Inc., Las Vegas, Nevada, as chief safety engineer.

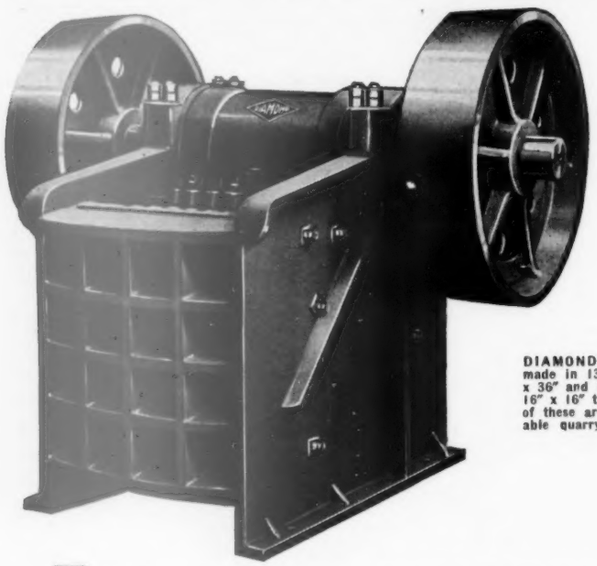
JOHN W. SHOTWELL, manager of the gypsum department of Certain-teed Products Corporation, has resigned and accepted the position of assistant general manager of the Saudi Arabian Mining Syndicate, Ltd., Jedda, Hedjaz, Saudi Arabia, and has sailed for that post.

STANLEY R. DURLAND, 62, head of the S. R. Durland Sand Company of Wilkes-Barre, Pennsylvania passed away in October.

JOHN J. KLEIN, assistant secretary of the Marmon-Herrington Company, died recently of pneumonia.

WARNER R. THOMPSON, 78, president of the molding-sand company bearing his name, died at his home in Detroit, October 31 after a long illness. He began his career as a messenger boy for the Western Union Telegraph Company. In 1914 he founded his own company, which he operated until the time

When You Buy a Crusher What Should You REALLY Buy?



DIAMOND Standard Jaw Crushers are made in 13 sizes from 6" x 12" to 24" x 36" and Roll Crushers in 6 sizes from 16" x 16" to 54" x 24", and various sizes of these are used in stationary or portable quarry plants and crushing units.

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2. Pitman and plates (or rolls) carefully made of suitably hard material to give long and satisfactory use.
3. Proper **balance** for easiest running and consequent economy of power.
4. Delivery of **full** capacity.
5. Construction primarily based on the hardest type of crushing.

Don't buy on claims unless those claims can be thoroughly backed by performance records. And speaking of records, DIAMOND has some recent and very outstanding ones we're anxious to talk about. Either we, or any of our dealers will tell you all about it. In fact, we'd like to consult with you on **any** crushing, screening, conveying or elevating problem you have.

WRITE US or contact our nearest dealer for full details of DIAMOND ROCK, SAND AND GRAVEL EQUIPMENT. Free bulletins on request.

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of his death. He also was president of the Burt Core Sand Company. He was active in Masonic circles and also belonged to a number of prominent civic and social clubs.

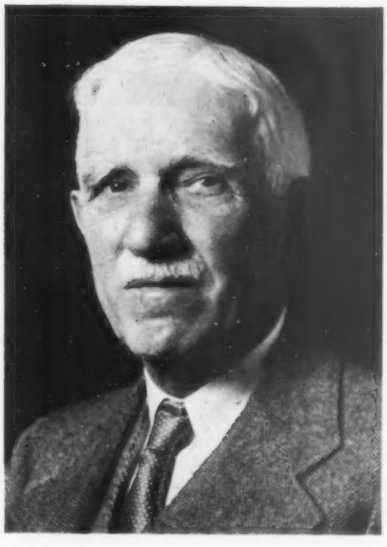
JAMES W. BLACKMON, 18, was instantly killed October 29 at Cheraw, South Carolina, when crushed by the steam shovel at the Becker County Sand & Gravel Company plant in that city. He was employed as an oiler.

JOHN W. THOMAS, 65 years old, who had served 29 years as master mechanic of the Ingalls Stone Company at Bedford, Indiana, died at the Dunn Memorial Hospital in that city October 28. He was a former member of the Bedford city council.

W. D. GOBLE, 58, traffic manager of the National Lime & Stone Company, Findlay, Ohio, died of a heart attack November 3 after a year's illness. He had been with the company since 1918.

JOSEPH B. RUSK, 63, of Terre Haute, Indiana, sales representative of the Louisville Cement Company for many years died recently following injuries sustained in a parking-lot accident in Indianapolis.

WALTER MORICE, 30, an employee of the Mississippi Lime Company at Ste. Genevieve, Missouri, died recently in a St. Louis hospital of injuries suffered when six tons of rock fell on him.



A recent photograph of Edward M. Ayers, pioneer producer of industrial sands, whose passing at the age of 79 was noted in the November issue of PIT AND QUARRY. The late Mr. Ayers was president of the Ayers Mineral Company, Central Silica Company and Millwood Sand Company, all of Zanesville, Ohio, operating a total of nine plants all located in Ohio.

TRAYLOR

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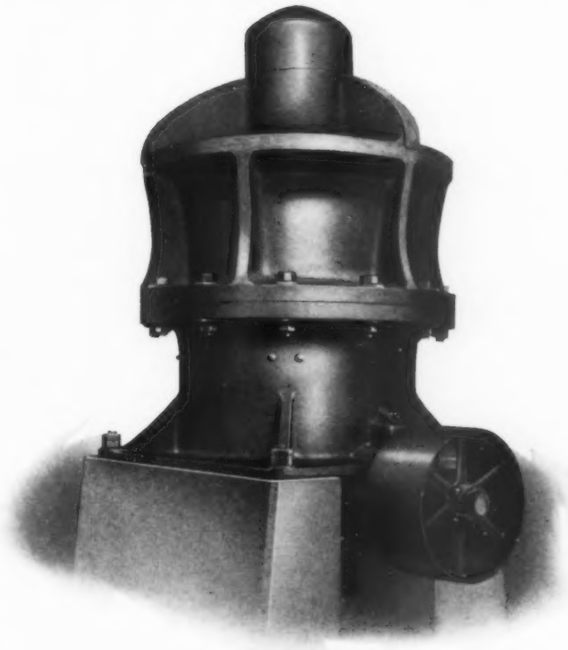

FOR medium fine product, (3/8" and plus in sizes up to the 3'-0" machine inclusive, and 7/16" and plus for the 4'-0"), there is no more efficient (average of less than 3/4 H.P.T. for all sizes) crusher than the Traylor Type TY Reduction Crusher. This is not merely a claim, but a statement of fact, based upon highly satisfactory results secured by users in over four hundred world-widely distributed installations of the TY machine, working in stone, sand and gravel, ores of precious and base metals, chemicals and numerous miscellaneous materials.

The reasons are several. Most important, the frame is cast steel and is, together with all parts, designed with liberal factors of safety, to resist even the most severe duty. Secondly, an automatic force-feed lubrication system, and a positive and time-tested dust exclusion device keep the machine from wearing out. That is, except for the concaves and the crushing head, which utilize every last ounce of wearing metal. These are the Traylor original, patented, non-chokable, self-tightening Bell Head and Curved Concaves (made of manganese steel), which have been used in over eight hundred reduction crushers during a period of less than a dozen years. By their use, packing and choking, with their attendant excess wear, are eliminated, power is saved, and large output is secured, of a product of uniform size, unusually free from oversize and excess fines.

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OCCUPATIONAL DISEASES and the LAW

Liability for Silicosis

Silva v. Erie Forge Company et al. (State Workmen's Insurance Board, Intervener), decided by the Superior Court of Pennsylvania, July 23, 1942; reported at 27 Atl. (2d) 727.

The claimant had been employed as an electric welder by the defendant for a period of about 13 years. In the performance of his duties he was constantly exposed to silica dust. As a result he contracted silicosis and became totally disabled on December 12, 1939.

On May 7, 1940 the claimant filed a petition seeking compensation for total disability. Answers were filed by the insurance carrier for the defendant employer and by the State Workmen's Insurance Board, custodian of the Occupational Diseases Fund. The referee awarded compensation under the Act of June 21, 1939, P.L. 566, Section 301(g), 77 P.S. Section 1401(g), and apportioned liability equally between the defendant company and the State Workmen's Insurance Board in accordance with Section 308(a) of the Act, 77 P.S. Section 1408(a). The award was affirmed by the Workmen's Compensation Board. In this appeal it was questioned whether the claimant was entitled to recover and appellants liable to pay compensation under the Act of 1939, and whether the apportionment of liability was governed by the Act of 1939 or by the Act of 1937.

In this case the disability occurred on December 12, 1939, more than two months after the effective date of the Act of 1939, which was October 1, 1939. The only act in force at the time of the occurrence of the claimant's disability was the Act of 1939, and hence, says the court, the claimant's claim for compensation must necessarily rest upon the provisions of that act. The court, accordingly, holds that the claimant is entitled to compensation under the Act of 1939 and that the apportionment of liability is governed by the provisions thereof, and the judgment is affirmed.

Poisoning

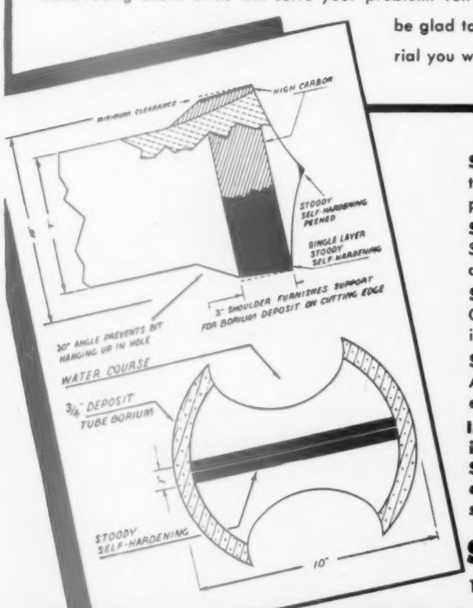
Nicholas v. St. Johns Table Company, et al., decided by the Supreme Court of Michigan, September 8, 1942; reported at 5 N.W. (2d) 442.

The worker in this case claimed compensation under the Michigan Occupational Disease Amendment for disability from toxic encephalitis resulting from the dipping of furniture in stain and brushing the furniture so dipped. The Department of Labor and Industry awarded compensation, on its conclusion that his occupational disease resulted from poisoning from benzol, which is a scheduled occupational disease (Act No. 61, Section 2, subdivision 8, Public Acts of 1937). The employer contends in this appeal, among other things, that there is no such occupational disease as "toxic encephalitis," but the court points out that occupational diseases under the act include not only poisoning by benzol, etc., but also its *sequelae; sequela* means "a disease or morbid condition left as the result of a disease."

The last injurious exposure oc-

UP TO
6 TIMES MORE
BLAST HOLE FOOTAGE
from Hard-Faced Churn Drills

In a very hard formation an Arizona mine operator was able to drill only 10½ feet of hole with machine-dressed churn drills. By rebuilding and hard-facing his bits as explained below he was able to increase footage to 65 feet before the bit lost gauge. This is not an unusual record of service for a hard-faced bit. Reports we are receiving from field engineers indicate that similar results are being obtained both by quarry operators and petroleum companies. If you are not obtaining satisfactory footage, perhaps the Stoody method of rebuilding and hard-facing churn drills will solve your problem. Tell us the size of your bit, and we will be glad to tell you how much hard-facing material you will need for a trial application.



STEP 1 Rebuild worn bit, as illustrated, with Stoody High Carbon to provide a support for the cutting edge.

STEP 2 Apply a single layer of Coated Stoody Self-Hardening over built-up area, bringing bit back to gauge.

STEP 3 Rebuild chisel of bit with Coated Stoody Self-Hardening, peening deposit to sharpen edge.

STEP 4 Apply 3/16 inch 20-30 mesh Acetylene Tube Borium to outer cutting edge.

IMPORTANT: To obtain the greatly increased churn drill life, Stoody Self-Hardening and Tube Borium deposits MUST BE PEENED while still red hot.

STOODY COMPANY
1136 W. Slauson Ave., Whittier, Calif.

STOODY COMPANY Hard Facing Alloys

curred February 22, 1940, after the effective date of the act, and therefore, disablement caused by the disease is compensable, whether the date of contraction of the disease was before or after the effective date of the act. While there frequently may be some question as to the exact moment when an occupational disease was contracted, when it did not immediately manifest itself, there can be no question that plaintiff's last injurious exposure occurred after the effective date of the act, and, therefore, Section 13 does not make disablement caused by such disease uncompensable."

The award of compensation is affirmed.

Notice of Disablement

Costanza v. Continental Undergarment Company, Inc., et al., decided by the New York Supreme Court, Appelate Division, Third Department, September 23, 1942; reported at 37 N.Y.S. (2d) 172.

The employer and its insurance carrier appealed from an award of the State Industrial Board for disability compensation in favor of the claimant. It was conceded that while engaged in a regular employment the claimant became disabled as a result of an occupational disease due to the nature of her employment. The only question raised on the appeal was that the claimant failed to give notice of disablement. The Industrial Board found that such notice had been given. The court holds that the evidence sustained the finding, and the award of the compensation is affirmed.

LABOR DECISIONS

Discouraging Membership

National Labor Relations Board v. Swift & Company, decided by the U. S. Circuit Court of Appeals, Eighth Circuit, July 10, 1942; reported at 129 Fed. (2d) 222.

This decision holds that where there was substantial evidence that a worker was offered employment if she would join a company union (which she refused), the finding of the National Labor Relations Board that the company's motive for refusing to employ her was to discourage membership in an outside labor union is binding upon the Court. An order of reinstatement and back pay is affirmed.

Amsco Dredge Pumps Producing Aggregates for T. V. A.'s Big Dams

The Tennessee Valley Authority, originally a long range program, has had heavy, urgent demands made upon its hydro-electric power resources because of the war. New aluminum, magnesium and chemical plants will require current in excess of present production.

To meet these requirements, several projected dams are being rushed to completion, notably the Apalachia and Ocoee Dams.

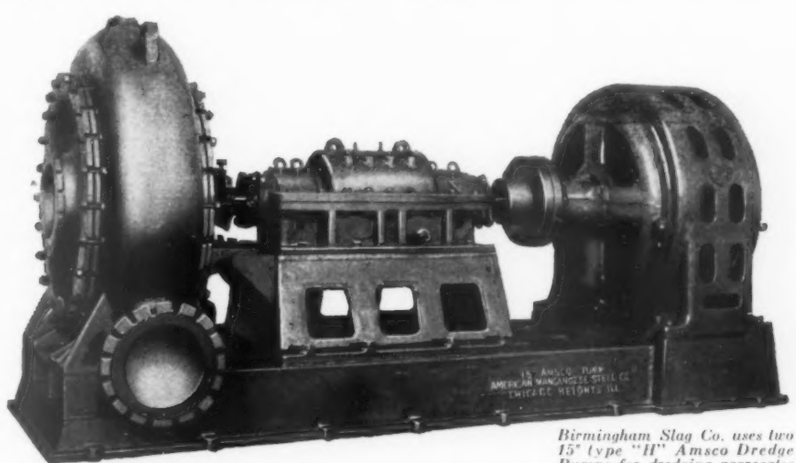
To supply sand and gravel for concrete aggregates, the Birmingham Slag Company uses two 15" Amsco type "H" heavy duty Dredge Pumps. They are powered by 400 h.p. 440 r.p.m. electric motors which receive current from diesel-generator sets.

Material is being dredged from the Tennessee River at its confluence with the Hiwassee River about 40 miles upstream from Knoxville, Tenn. All materials are pumped directly to barges which are towed to the company's modern, shore-type screening and classifying plant at Calhoun, Tenn., 20 miles up the Hiwassee. Barges are unloaded by clamshells which empty into hoppers feeding belt conveyors. After washing and sizing to specifications, processed material is shipped by railway to the dam site.

The large volume of sharp material dredged is handled with minimum wear by the tough manganese steel water-end parts of the Amsco Dredge Pumps used.

Besides helping these projects to rapid completion, the Amsco Pumps are saving metal, in that water-end parts less shock and abrasion resistant would have to be replaced more frequently.

A bulletin is available completely describing Amsco Dredge Pumps of standard and Counterflow design, and dredge cutterheads, piping valves and fittings.



Birmingham Slag Co. uses two 15" type "H" Amsco Dredge Pumps for dredging aggregates from Tennessee River for construction of T.V.A. Dams.

Amsco

AMERICAN MANGANESE STEEL DIVISION
OF THE AMERICAN BRAKE SHOE & FOUNDRY CO.
Chicago Heights, Illinois

Genuine Manganese Steel, "The Toughest Steel Known"
Chromium-Nickel Alloy Castings for heat and corrosion
Power Shovel Dippers. Dredge and Industrial Pumps
Welding Materials for reclamation and hard-surfacing

FOUNDRIES AT CHICAGO HEIGHTS, ILL., NEW CASTLE, DEL., DENVER, COLO., OAKLAND, CALIF., LOS ANGELES, CALIF., ST. LOUIS, MO.
OFFICES IN PRINCIPAL CITIES

Lawful Union Activities

National Labor Relations Board v. Peter Cailler Kohler Swiss Chocolates Company, Inc., decided by the U. S. Circuit Court of Appeals, Second Circuit, July 16, 1942; reported at 130 Fed. (2d) 503.

During the time of a milk strike, or "milk holiday," a union of the employees of the respondent company, a large user of milk, adopted a resolution declaring a protest to the management of the company against its actions in the matter and solidarity with the farmers' union concerned. The company considered the resolution a grave injury to its business, "which perhaps it was", and dismissed the union president as the moving spirit. The National Labor Relations Board ordered his reinstatement with back pay, and that order is affirmed by the court.

So long as a union's activity is lawful, the court "can see no justification for making it the occasion for a discharge; a union may subsidize propaganda, distribute broadsides, support political movements, and in any other way further its cause or that of others whom it wishes to win to its side. Such activities may be highly prejudicial to its employer; his customers may refuse to deal with him; he may incur the enmity of many in the community whose disfavor will bear hard upon him; but the statute forbids him by a discharge to rid himself of those who lay such burdens upon him. Congress has weighed the conflict of his interest with theirs, and has *pro tanto* shorn him of his powers. Unless therefore the resolution was itself a wrong against the chocolate company, Whipple's discharge was an 'unfair labor practice.'"

Discharges

Dannen Grain & Milling Company v. National Labor Relations Board, decided by the U. S. Circuit Court of Appeals, August 19, 1942; reported at 130 Fed. (2d) 321.

This decision affirms an order of the National Labor Relations Board except in so far as it required the reinstatement with back pay of an employee whom the board held to have been discharged because of union membership and activities. The employer contended that the discharge was for good cause (negligence in the operation of motors), and the court concludes from the evidence that the employee's union membership did not have "the slightest relation to his discharge."

"The law protects an employee only in respect to his entire freedom in joining or not joining any labor organization he desires and thus selecting his bargaining representative," said the court. "Discharge of an employee because of union sympathy, membership or activity is interference with such liberty. The law does not affect the right of the employer to discharge any employee for reasons other than interference with the above liberty of the employee. An incompetent employee is given no protection by the law against the results of his own incompetence. The difficulty in the practical situations of discharge which arises is to determine whether the discharge is for cause or for union activities not approved by the employer. Where there is substantial evidence justifying a conclusion that the employer is opposed to organization of his employees by any or a particular union, and especially where (as here) there is some evidence of a manifested desire to be rid of employees who become union members, we think the practical application of the law, to make it effective within but not beyond its limits, is to hold a discharge improper unless the evidence is very convincing that a finding of improper discharge is arbitrary."

Unemployment Benefits

National Labor Relations Board v. Marshall Field & Company, decided by the U. S. Circuit Court of Appeals, Seventh Circuit, June 26, 1942, rehearing denied July 15, 1942; reported at 129 Fed. (2d) 169.

A consent decree ordered the respondent company to reimburse two employees for any loss of pay suffered by reason of discrimination against them, by payment of money equal to wages they would normally have earned to the date of the offer of reinstatement, less their net earnings during the period concerned. The company alleged, in this proceeding for enforcement of the order, that it had fully complied with the order, including payment of what the employees concerned would have earned during the period in question, less amounts received as unemployment compensation.

The court holds that the order of the board did not allow the company to deduct the unemployment benefits paid to these employees, and that the order was within the powers of the board. "Only by distorting the English language could we say that unemployment benefits are 'earnings.'" The fact that the employees may possibly receive more money for the period of their unemployment than they would have received if employed is held not to mean that the board has imposed a penalty upon the company, which the act would not authorize.

Interstate Commerce

Cullum v. Stevens, decided by the U. S. District Court, Northern District of Texas, Fort Worth Division, March 27, 1942; reported at 46 Fed. Supp. 73.

This was a suit under the Fair Labor Standards Act of 1938, the plaintiff being an employee of a machine shop, and his particular claim being based on the manufacture of goods for interstate commerce. The court holds that the fact that the employer did not know that the articles on which the employee worked, which were made for a third party, passed into interstate commerce does not prevent recovery of minimum wages under the act, since whether an employer violates the act and becomes liable to an employee for minimum wages or overtime, or both, "does not depend upon, or require proof that, the violation was wilfully or knowingly done."

The defendant, proprietor of the machine shop, claimed exemption as a service establishment. This claim is denied on the facts, which showed that the employee "manufactured" pumps from material supplied in part by the employer and in part by the third person by whom the work was ordered. However, the defendant is held not to be liable for the whole time that the employee worked, but only for such time as the latter worked on the pumps concerned.

Collective Bargaining

Lebanon Steel Foundry v National Labor Relations Board, decided by the U. S. Court of Appeals for the District of Columbia, June 29, 1942; reported at 130 Fed. (2d) 404.

The question in this case was whether certain check-off cards signed by employees constituted evidence of authority to bargain collectively. The cards concerned authorized the employer to withhold from pay checks and to pay to a union sums identified as union dues. This the court holds to be sufficient evidence that the signers were applying for membership in the union and were authorizing the union to bargain collectively on their behalf. An order of the National Labor Relations Board is ordered to be enforced.

TRAFFIC News Digest

I. C. C. Reports

Cement. Docket 28755. Colorado Portland Cement Company v. Apache Railway Company *et al.* By Examiner J. Edgar Snider. Dismissal proposed. Rates on cement in packages or in bulk, carloads, minimum weight, generally, 60,000 pounds, from Portland, Colorado, to various destinations in Arizona, not unreasonable or otherwise unlawful; and failure to make an allowance for grain doors and bulkheading, not unreasonable or otherwise unlawful.

Truck Reports

Thurman, Iowa. M. C. 83625. Sub. 1. Hubert F. McLuskey, extension. Certificate proposed. Agricultural commodities between points in Iowa and Nebraska; sand and gravel from points in Nebraska to points in Iowa; and crushed rock from points in Nebraska to points in Iowa.

Providence, R. I. M. C. 103601. George Panta, common carrier. Certificate proposed. Coal from Providence to points in Connecticut and Massachusetts, within 25 miles of the Rhode Island state line, and sand, gravel, crushed stone, asphalt, brick and cement between points in Rhode Island and points in Connecticut and Massachusetts, within 25 miles of the Rhode Island state line.

ODT Order No. 18 ODT Order No. 18 which became effective November 1 providing for the following car loadings for the lime and stone industry:

1. Lime in bags or containers: Must be loaded to a minimum weight of 70,000 pounds.

2. Lime in bulk in box cars: Must be loaded to 80 per cent. of the marked capacity of the car, but in no case less than 80,000 pounds, except that if the interior walls of the car are partially sheathed or lined to an elevation insufficient to allow such loading without overrunning the sheathing or lining, then to the utmost elevation practicable without causing such overrunning.

3. Limestone, ground, in bags or containers: Must be loaded to a minimum of 80,000 pounds.

4. Limestone, in bulk, in open-top cars: Must be loaded to the marked capacity of the car.

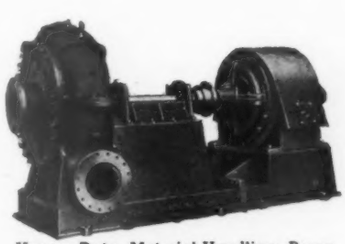
5. Limestone, in bulk, in box

PUMPS BY MORRIS

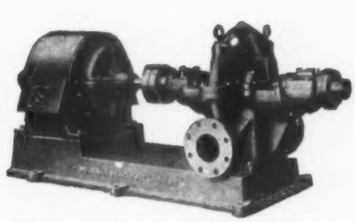
. . . these three words explain the dependable service and low operating and maintenance costs in hundreds of hydraulic dredges on sand and gravel production all over the country.

The reasons? . . . 70 years of experience in building centrifugal pumps for handling abrasive materials of all kinds . . . an engineering department which has always pioneered in centrifugal pump advances of design and efficiency . . . a plant manned by craftsmen to whom each unit is a "special order."

For maximum efficiency and lasting reliability, investigate Morris designs of centrifugal pumps and hydraulic dredges. Bulletins on request.



Heavy Duty Material-Handling Pump for Coarse Abrasives

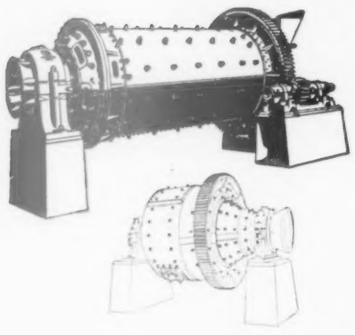


Double Suction Horizontally Split Pump for Clear Liquids

MORRIS MACHINE WORKS — MORRIS ESTABLISHED 1864 — BALDWINSVILLE NEW YORK

CENTRIFUGAL PUMPS

IF YOU ARE OPERATING A BALL OR PEBBLE MILL



Write for—

"Operation Notes for Ball Mill Users" —Bulletin No. 25-A

Many mills are now being used to produce new products for the War Program. This bulletin contains data that will aid you in improving the operation of your mill.

REPAIR PARTS

We can furnish repairs for any Hardinge Conical Mill if you will give us the mill number on nameplate attached to shell of mill.

HARDINGE
COMPANY, INCORPORATED
YORK, PA., Main Office & Works
NEW YORK, 122 East 42nd Street
CHICAGO, 205 W. Wacker Drive
SAN FRANCISCO, 501 Howard St.
TORONTO, 200 Bay Street

cars: Must be loaded to the marked capacity of the car, or to an elevation not lower than 18 inches from the roof of the car measured at its side walls, or, if the interior walls of such cars are partially sheathed or lined, to the utmost elevation practicable without overrunning the sheathing or lining.

Truck-Mileage Reduction

General Order No. 17 which affects motor carriers requires that they must reduce the mileage of each their operating units by at least 25 per cent. as compared with the corresponding month of last year. This must be done even if the number of trucks operating in any unit has been increased during the interim. Under the order a carrier adding to the business of an operating unit through the purchase of an operation or portion of an operation from another carrier must reduce the 1942 mileage of the operating unit by at least 25 per cent. of the total 1941 mileage of the original and the acquired operations combined.

Central Freight Association

Docket 71395. (Shipper's proposal) Crushed stone, in open-top cars, carload. Establish a rate of 94 cents per net ton from Middlepoint, Ohio, to Ferguson, Indiana. Plus Ex Parte 148 increase.

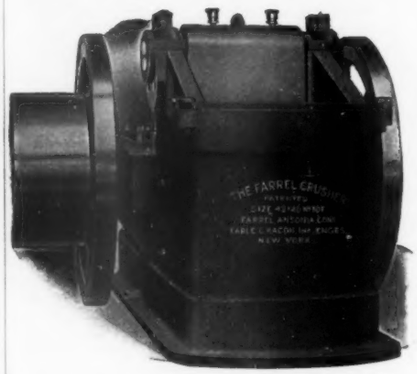
Docket 71396. (Shipper's proposal) Rip-rap stone. Carload. Minimum weight 90 per cent. of the marked capacity of the car, except that when the car is loaded to its visible or cubical capacity, the actual weight will apply. Establish a rate of $2.22 per net ton from Flaggy Meadow, Waynesburg, and Opekiska, West Virginia, to Ambridge, Pennsylvania, *via* regular established percentage routes. Subject to Ex Parte 148 increase.

Docket 71959. (Shipper's proposal) Sand and gravel, carload. Establish a rate of $1.10 per net ton from Riverton, Indiana, to Cynthiana, Evansville, Ingle, Poseyville and Wansford, Indiana. Also a rate of $1.21 per net ton from Riverton to Mt. Vernon, Oliver and Solitude, Indiana. *Via* I. C. R. R., Sullivan, Indiana, C. & E. I. Subject to Ex Parte 148 increase.

Docket 71328. (Supplement No. 1 to W. D. A.) Lime, agricultural, carload. Minimum 30,000 pounds. W. D. A. 71328, DB 3137, dated July 16, 1942, covering proposal to establish a rate of 9 cents per 100 pounds from Luckey, Ohio, to Ber-

FARREL BACON CRUSHERS

Complete plants designed and equipped, including Screens, Elevators and Conveyors. Machinery for Mines and Rock Quarries, Sand and Gravel Plants. Engineering Service.



EARLE C. BACON, Inc.
17 John St. New York, N. Y.

The TY-ROCK FULL FLOATING CIRCLE THROW SCREEN

Coarse and Medium Sizes
Live Rubber Mountings
No Escaping Vibration

HIGH TONNAGES OF ROCK

The W. S. Tyler Company
CLEVELAND, OHIO, U. S. A.

key, Ohio, is hereby amended by adding Martin and Genoa, Ohio, as origin points.

Docket 72221. (Shipper's proposal) Pig mold coating, having a limestone or roasted-dolomite base, ground or pulverized. Carload. Minimum weight 90 per cent. of the marked capacity of the car, except that when the car is loaded to its full visible or cubical capacity, the actual weight will apply. Establish a rate of $2.92 per net ton from Gibsonburg, Maple Grove, Millersville and Woodville, Ohio, to Riddlesburg, Pennsylvania. Subject to Ex Parte 148 increase.

Docket 72229. (Shipper's proposal) Limestone, agricultural, unburnt. Carload. Minimum weight 50,000 pounds. Establish a rate of $1.98 per net ton from Gibsonburg and Woodville, Ohio, to McClainville, Ohio. Subject to Ex Parte 148 increase.

Docket 72231. (Carrier's proposal) Block, building, solid, hollow or perforated, made of cement or concrete, not reinforced with metal, except enameled, individual blocks not being packed. Carload. Minimum weight 60,000 pounds. Establish a rate of $1.76 per net ton from Columbus, Ohio, to Oldham, Ohio. Subject to Ex Parte 148 increase.

NEW MACHINERY and SUPPLIES

• Truck Conversion

The growing emphasis being put on the necessity for conserving manpower and the critical situation regarding many metals directs attention to the Truckstell method of building "little trucks into big ones."

Thousands of additional heavy trucks are needed to keep war material moving at the necessary high speed but the government's pool of such units is rapidly being exhausted.

Dumping gravel to hopper with converted 1½-ton truck.

The Truckstell conversion method, approved by W. P. B. officials, not only provides practical means of building rugged, powerful and economical trucks but ties right in with the conservation program.

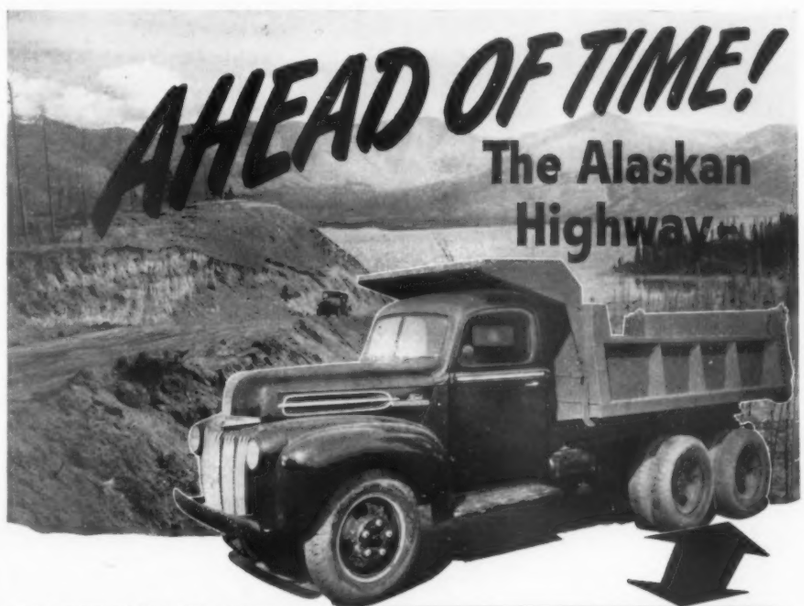
By rebuilding new and used 1½-ton trucks into units rated at 3½ to 6 tons capacity as trucks and up to 50,000 pounds as tractors thousands of man hours and vast quantities of metal in these completed chassis are conserved. Furthermore the increased capacity of the expanded truck will permit one driver and one truck to haul two or three times as much payload as two or three drivers with the same number of smaller standard trucks.

Thousands of these medium trucks in dealers' storage can now be converted quickly into rugged, powerful economical trucks.

Truckstell, Inc., Cleveland reports growing activity in support of its plan by dealers all over the country.

• Tractor Shovel

An all-round utility machine which helps the war effort by conserving machinery and reducing the time and cost of getting work done is the Drott Bull Clam shovel. It handles most shovel jobs, everything a bulldozer will do and all scraper operations, plus the work of many other units, according to its manufacturer, the Hi-Way Service Corporation, Milwaukee.



AMERICA'S LIFE LINE TO THE NORTH IS OPEN!—

Operating months ahead of even the stiff schedule set up by Army engineers!

A tough assignment in rough country calling for husky, durable, efficient equipment — and right on the job is a big fleet of trucks with

Put TWO driving axles under the load instead of one, double the gear speeds, improve springing and load flotation, gain vastly superior tractive ability.

THORNTON FOUR - REAR - WHEEL DRIVE

By means of **THORNTON** installations these trucks have been converted from 1½ to 2-ton vehicles into heavy-duty, four-rear-wheel drive trucks handling 6-yard dump bodies.

Standard heavy-duty trucks are not available today — but here is the answer to that problem. You can convert new or used 1½ to 3-ton trucks to husky, reliable heavy-duty units of more than twice the capacity. They actually do the job better and cost less.

While Uncle Sam still approves, act quickly! Contact your nearest Truckstell-**THORNTON** dealer or wire the factory direct. Trained men will engineer this equipment to suit **YOUR OWN PARTICULAR JOB.**

THORNTON TANDEM CO.
8707-8779 GRINNELL AVE. DETROIT, MICH.
Manufacturers also of the THORNTON automatic-locking DIFFERENTIAL
"When you need TRACTION you need THORNTON"

SCREENS

NEW HOLLAND CIRCLE THROW

vibrating screens. Rugged construction. Positive vibration. Their outstanding service *lies in the balance!*

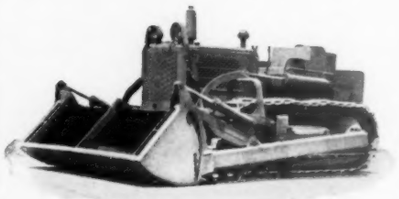
Other New Holland Items

Crushers, Pulverizers, Elevators, Screens, Conveyors, Power Mowers, Belting, Engines, Furnaces, V-Belt Drives, Feed Mills, Electric Motors, Concrete Mixers, Dewaterers, Semi-Steel Castings, Gray Iron Castings, Pick-up Baling Presses

Write for Folders

NEW HOLLAND MACHINE CO.
NEW HOLLAND, PENNSYLVANIA

Hydraulically controlled from the driver's seat, it digs, carries or floats material, dumps it—cuts smoothly and spreads evenly. Depth of the cut is regulated by the raising and lowering of the clam. By moving forward, the dirt "boils" into the shovel leaving a level footing for the tractor at all times. The material is moved the shortest route in any direction, because the load is always ahead of the tractor. Either end may be tilted independently to a 24-inch angle



The "bull clam" shovel.

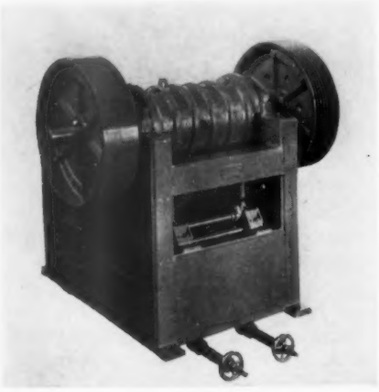
from the driver's seat while the tractor is in motion. The shovel is built close to the tractor and is perfectly balanced, running free of the tractor. By keeping the clam wide open, the outfit may be used as a bulldozer without obstructing the view of the operator.

Available in various sizes, Bull Clams are made to fit all makes and models of tractors and have heaped capacity ranges of one to four cubic yards. Their lifting capacities are 3,000 to 12,000 pounds. Objects or material may be carried as high as three feet above ground. The drop below ground level is one foot.

• Welded Crusher Base

The accompanying picture shows a jaw-crusher base which was redesigned from cast to welded construction and described in a paper for which the authors, Ralph W. Heer and William A. Eckley, assistant chief engineer, and designer, respectively, Pioneer Engineering Works, Inc., Minneapolis, received an award of $500 in the $200,000 welding study program sponsored by the James F. Lincoln Arc Welding Foundation.

The authors describe numerous advantages gained by welding jaw crusher bases. Since the function of the machine is to crush by jaw action alone, it is necessary to have great strength in the base. Older designs were of ribbed cast design. The added strength of box design was observed, found difficult for



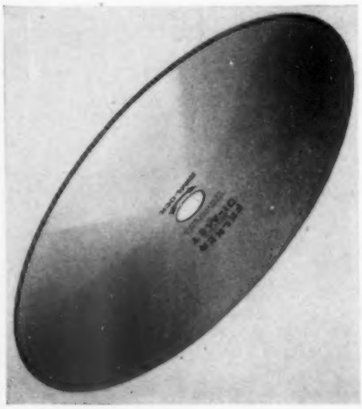
Crusher as re-designed with welded base.

casting but was used in the welded base. The result was a stronger, lighter and better looking base.

Experience in welding technique resulted in the reduction of $104 from the cost of the first unit ($399). Weight savings range from 15 to 30 per cent. without loss in strength and cost savings ranged from 11 to 35 per cent.

• Abrasive Saw

The Felker Manufacturing Company of Torrance, California, announces a new diamond abrasive cut-off blade—the Di-Met Rimlock. This new blade is particularly efficient in cutting all hard, brittle non-metallic materials, such as



Diamond abrasive cut-off saw.

Prevent BURN-OUTS *at both* KILN-ENDS

The use of PYRASTEEL Kiln Ends is not by any means confined to the *discharge end.*

Such high temperatures are frequently encountered at the *feed end* of the kiln, as to make the use of

PYRASTEEL SEGMENTS

the most practical method of preventing *burnouts* and interrupted operations.

There are many PYRASTEEL installations on the *feed end* and on the *discharge end* of rotary kilns . . . . also where both the feed and discharge ends are provided with PYRASTEEL Segments. All are giving satisfactory results.

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CHICAGO STEEL FOUNDRY COMPANY
KEDZIE AVE & 37TH ST.
CHICAGO
Makers of Alloy Steel for 30 Years
PYRASTEEL for high temperatures
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quartz, glass, porcelain, tile, ceramics, concrete products, etc.

The Rimlock differs from former diamond abrasive blades in the special bonding process which rigidly locks the diamonds in the rim of the wheel without crushing and with the benefits of longer life and considerably faster cutting ability. It is available in two types: a hard steel bond that makes an exceptionally stiff and fast cutting blade, and in a copper bond which though not quite so fast or stiff as the steel, operates with a softer action and with some increase in life.

• Four-Wheel Drives

The Thornton Tandem Company of Detroit, Michigan manufacturers of the Thornton Four-Rear-Wheel Drive for motor trucks, is making deliveries on 500 units for a prominent construction company, to be used on the new Canada-Alaska Highway. The Thornton units are applied to Ford trucks and are then equipped with 6-cubic yard dump

One of the 500 four-wheel-drive trucks on the Alaska highway.

bodies made by the Anthony Company of Streator, Illinois. These bodies are 10½ feet long. The Thornton four-rear-wheel drive utilizes two driving axles under the load and provides a heavy-duty performance for on or off-the-road operation.

The "Alcan" highway, which has been termed "America's Burma Road," starts at Edmonton, focal point for the railways and highways that run South and East of the principal industrial manufacturing and supply centers of the United States. Nearly 1,200 miles of new road has been cut through the forests to Fort Nelson, White Horse, in the Yukon territory, and then to Fairbank. The highway totals 1,600 miles in length.

• Motor Finder

To help motor users fill their wartime motor needs with the least possible delay, as well as conform to recent WPB recommendations, Allis-Chalmers now offers a new "Motor Finder" for quickly selecting the various types of squirrel-cage motors.

Standard types of the squirrel-cage—the most readily obtainable motor—are actually even more versatile than is commonly realized, this prominent motor manufacturer points out. Because of this, and important savings in time and materials due to standardization, WPB is urging careful consideration of the squirrel-cage types first.

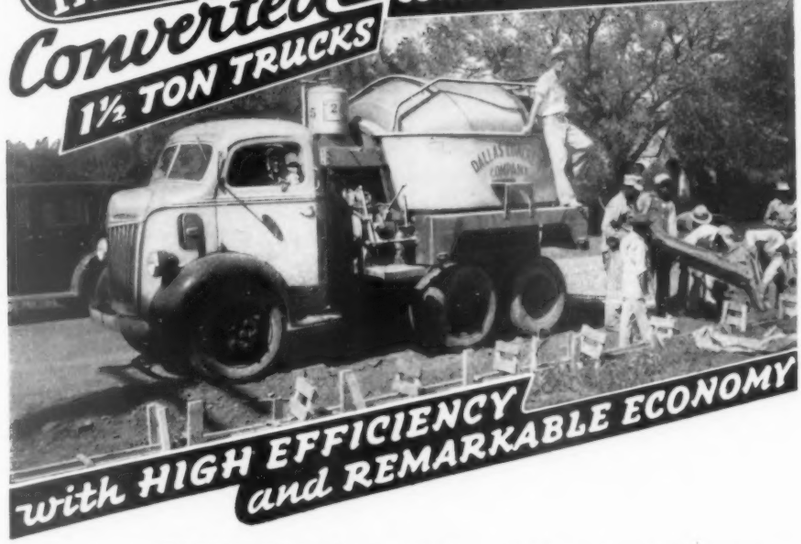
With the new "Motor Finder" slide-rule, the motor user is able to match the conditions under which the motor must operate at the proposed installation with the required motor characteristics and instantly learn the right motor type and its features.

So handy is the new "Motor Finder", that only three simple steps are necessary to pick a motor. Since over thirty standard types, covering a range in horsepower from ½ to 75, are included in the Allis-Chalmers Lo-Maintenance line, all of the characteristics of versatility of squirrel-cage motors are immediately considered in using the slide-rule. The potential motor buyer thus takes fullest advantage of the most available motors he can buy in wartime.

Copies of the new slide-rule can be obtained free of charge on request from the Allis-Chalmers Manufacturing Company, Milwaukee.

The "slide-rule" motor finder.

TRUCKSTELL Converted 1½ TON TRUCKS Serve the CONSTRUCTION INDUSTRY with HIGH EFFICIENCY and REMARKABLE ECONOMY



CONSTRUCTION activities, which involve uncommonly heavy trucking operations, are being handled successfully by TRUCKSTELL Conversions of 1½ ton new and used trucks—a method of "making big ones out of little ones" that is now approved by Government officials.

TRUCKSTELL can meet your requirements whether you need four or six wheel units—for tractor or conventional service—to mount heavy concrete units, large dump bodies or platforms for hauling building materials or heavy machinery.

THORNTON Four Rear-Wheel-Drive CONVERSION
TRUXMORE Trailing 3rd Axle CONVERSION
CLARK Automatic Booster CONVERSIONS
HEAVY DUTY Clark Axle CONVERSIONS
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CLARK SPOKE WHEELS
DIAMOND Safety Gas TANKS
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Years of experience and thousands of practical conversions justify your confidence in this modern and advanced method of building powerful, economical trucks to meet present emergency needs and after the war requirements.

Write for complete information.

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CONVERTERS of TRUCKS for EXPANDED USEFULNESS
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LIMESTONE PULVERIZERS
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Stationary or Portable
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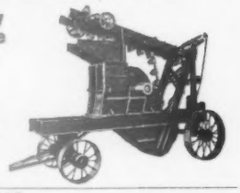
Crushes Large Stone to 2" minus Down to Agricultural Dust
Built in (8 Sizes)



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Self Traveling Tractor
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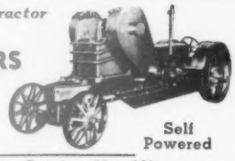
Ideal for maintenance and access road work



Self Powered

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GRUENDLER
CRUSHERS · PULVERIZERS · GRINDERS

GRUENDLER CRUSHER & PULVERIZER CO.
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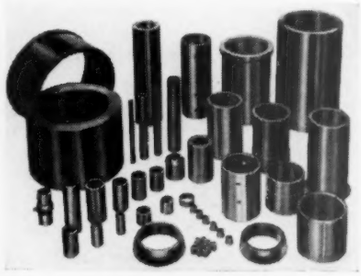
• Non-metallic Bearings

Shortage of critical bearing metals is being overcome and performance results improved through the use of oil-lubricated non-metallic molded bearings developed by the Gatke Corporation, Chicago.

Known as Lubritex bearings, they are distinctly different from Gatke Hydrotex (water-lubricated) and Gatke Grafitex (self-lubricated) bearings in that they are made of various material combinations developed especially to meet all kinds of service conditions using grease or oil lubrication.



An assortment of sizes and shapes of non-metallic bearings.

According to the manufacturer, Lubritex bearings are replacing conventional bearings with highly satisfactory results on all kinds of service. They stand up under impact loads that are too great for metal bearings, have much greater wear life and lower friction. Lubrication is much less critical—they do not score journals, even if lubrication fails for limited periods.

• Respirator

In order to save metal for war production, the M. S. A. Comfo Dust Respirator has been re-designed with filter cases of black plastic, according to the Mine Safety Appliances Company, Pittsburgh.

U. S. Bureau of Mines-approved, this well-known respirator now offers better appearance plus less resistance to air flow, according to the manufacturer. The new filter container units are thinner, with rounded edges, permitting even better sidewise and downward vision.

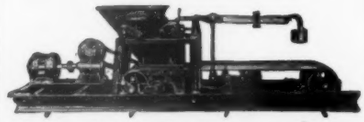
The re-designed plastic filter cases have high impact strength with no electrical conductivity. They are not affected by perspiration.

Retaining every Comfo advantage of safety and comfort in dust protection, the field-proved plastic model has twin side-placed replaceable filters of unusually large area. The unit is easy to clean and maintain, and is available in types to meet various dust and mist conditions.

• New Distributor

Sauerman Brothers, Inc., Chicago, announces the appointment of J. R. Norton, 11 West 42nd Street, New York City, as distributor to succeed W. R. Elden, who died recently. Mr. Norton is well known to the buyers of construction and mining machinery in the New York district, having maintained a sales office there for a number of years.

Over One Thousand



Schaffer Poidometers

Designed and Built to Serve Industry With Speed Economy Precision

In hundreds of plants throughout the world the Schaffer Poidometer has displaced the old rule-of-thumb method of proportioning raw and finished materials.

In every instance the change has resulted in greater production, assured uniformity of product and important economy.

Schaffer Poidometers are built to stand hard, continuous service. The increased tempo caused by the war emergency has further emphasized their ability to take it.

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is in what it costs per yard per 100,000 yards. On that basis a HAISS will prove out to cost you less than anything else we know of . . . Write for catalog.

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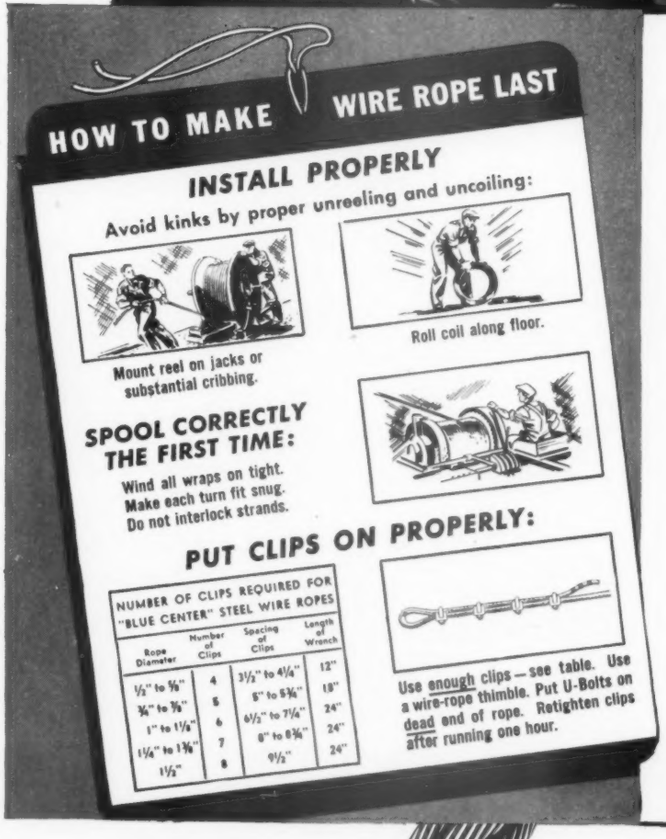
A whole year's tips on a handy tag...
TO GO WHERE IT'S NEEDED MOST



ALL THROUGH 1942, our advertising has brought you much valuable information on how to install wire rope, how to maintain and inspect it, how, in brief, to make it last as long as possible.

Many of you executives and operating men have expressed a desire to pass along this information in simple, handy form to your men who really handle the rope, so they'll be able to use it right on the job.

Here they are—a whole year's tips on wire-rope conservation—on a sturdy, convenient tag you can have fastened right to equipment, on controls, or to the wire rope itself.

Printed on heavy stock and varnished for further protection, the tags are ideal for use right on the job—durable, washable, always legible. And they're yours for the asking! *WRITE FOR "TAG A".*

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TRENTON, NEW JERSEY
Branches and Warehouses in Principal Cities

★ PROMPT SERVICE
★ on essential orders
from warehouse
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ROEBLING
"Blue Center"
STEEL WIRE ROPE
PREFORMED OR NON-PREFORMED

KENNEDY STONE PREHEATER AND DEHEATER

Saves in Lime Production

40% SAVINGS IN FUEL
20% INCREASE IN CAPACITY

Plus
A Better Product!

It has been known for many years that better lime could be made in rotary kilns than in vertical kilns, but at a considerable handicap in price.

The great length of former types of rotary kilns, sometimes exceeding 400 feet, has failed to solve the problem of efficiently reducing the temperature of the exit gases.

Now, thanks to the KENNEDY principle of preheating and deheating, it is possible to make a high-grade lime of better quality than was formerly obtainable in long or short kilns at greatly reduced cost of production.

This principle permits the effective recovery and use of the exit gases, and in actual operation has shown 40% saving in fuel, with capacity increased 20% and more.

Short kilns employing the KENNEDY method also acquire an internal glaze which lessens the wear on kiln liners, lowers the power requirements, and reduces the formation of kiln rings.

Overburned and underburned lime is practically eliminated. Coal feed and lime calcination are switchboard controlled.

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Also Manufactures
CRUSHING, SCREENING, AND ELEVATING EQUIPMENT
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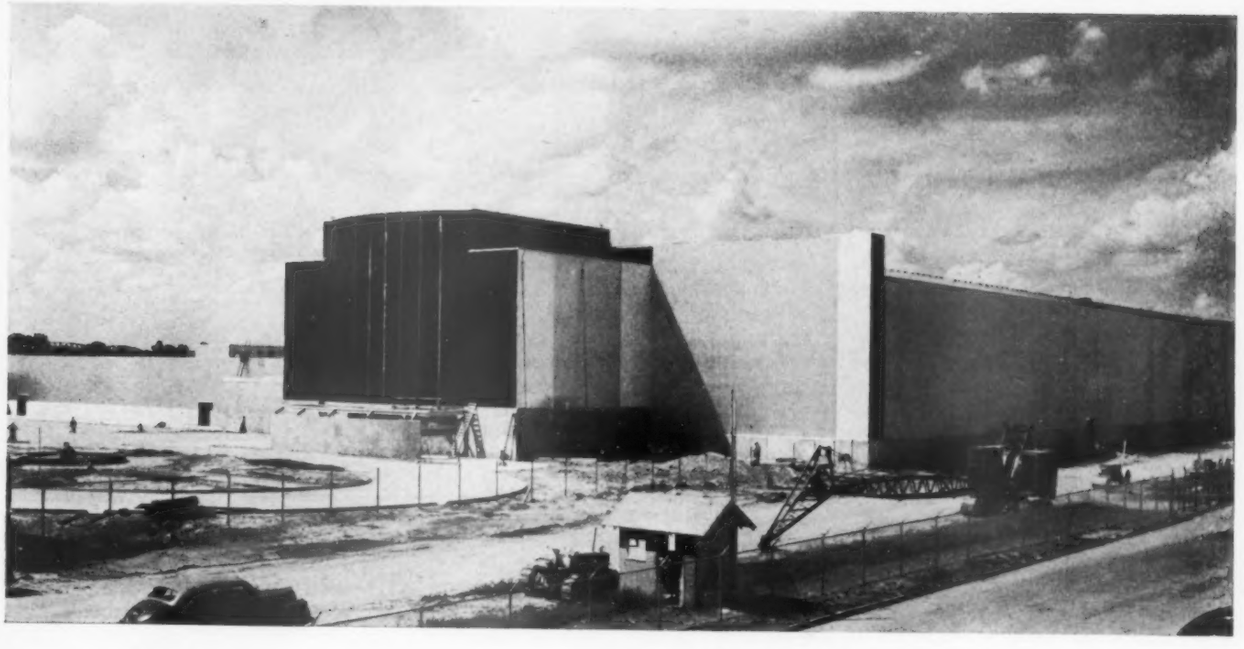
December 1942

The CONCRETE MANUFACTURER

A Special Section of ... IT



Eagles' Nest

Cinder Concrete Products, Inc. furnished 200,000 Stearns Vibrated Cinder Blocks for this Bomber Plant. All block walls are exposed and painted.

From this mammoth incubator, brood upon brood of war birds wing their way to the fighting fronts to drop their destructive eggs on the enemy.

Stearns-equipped concrete block plants in every state are supplying blocks for such war plants, while here in Adrian the Stearns factory has been converted 100% to the production of war machine parts that cannot be described to you.

LET'S GO! U.S.A. KEEP 'EM FLYING!

STEARNS

MANUFACTURING CO. - ADRIAN, MICH.

GENE OLSEN, PRESIDENT

We are still able to supply from stock, for necessary construction work, Stearns Vibration and Tamp Type Block and Brick Machines, Mixers and Skip Loaders. Let us know your needs.

• CONCRETE PRODUCTS • READY MIXED CONCRETE

The CONCRETE MANUFACTURER

December, 1942

A SPECIAL SECTION OF PIT AND QUARRY DEVOTED TO PRODUCTION MARKETING AND USES OF CONCRETE PRODUCTS AND READY - MIXED CONCRETE

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The present Boichot concrete plant and, at right, the new plant under construction.

Boichot Erecting New Batcher

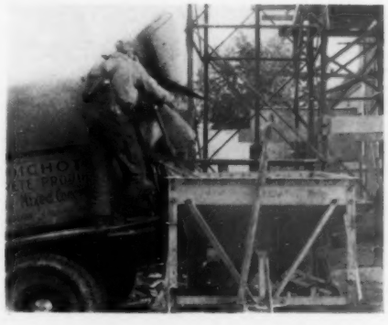
Construction is under way on a new Butler batching plant by the Boichot Concrete Products Company at Lansing, Michigan. The company has been in the ready-mixed-concrete business for the past two or three years, batching its materials in a plant assembled from equipment it took over when it acquired the physical assets of the now defunct Lansing Cast Stone Block Company.

The bins in the new plant will be loaded from a ramp to eliminate aggregate and cement elevators, and the modern facilities it contains will enable the concern to serve its customers more efficiently. Five Smith-Mobile high-discharge truck-mixers are at present being operated and these will continue in service at the new Butler plant with the possible addition of one or two more. The newest unit is a 5-cubic yard model mounted on an International 8-wheel tandem-drive truck chassis. The other units are 2- and 3-cubic yard models, also carried on International chassis.

Truck-mixer discharging to portable hopper.

All the aggregates used are produced by the parent concern, the Louis J. Boichot Sand & Gravel Company, which operates two dredge plants north of the city of Lansing. Concrete bricks are also made, a standard model Dunbrik machine molding the units. Another recent addition to the company's ready-mixed-concrete facilities is a

(*Continued on page 82*)



Another view of the portable hopper.

The new 5-cubic yard truck-mixer.

General plant view with kilns in foreground and some of the block and pipe storage.

24-HOUR OPERATION, PRESSURE CURING ENABLE FIRM TO MEET WAR SCHEDULES

● This producer of concrete pipe and blocks never thought, when he built one of the most modern plants in the southeast, that it would become an important factor in speeding up our war effort. When rush orders poured in for pipes and blocks for the construction of army camps and air bases, this plant was equal to the task. Especially important were the steam-curing facilities which are probably the most complete in this area.

THE Wallace Concrete Pipe Company of Columbia, South Carolina is one of the many producers of concrete pipe and blocks who have contributed in no small measure to the speeding up of our war program. This company had sold most of its pipe for highway construction and their demand increased steadily since the formation of the company in 1935. The manufacture of concrete blocks was begun in 1939 and their output has also grown considerably. Most of these had been sold for private building construction. As the demand increased new equipment was installed and other plant improvements were made. The result is one of the largest and most efficient plants in the southeast.

The ability to make high-grade products in large quantities stood the company in good stead when army camps and other war projects began to spring up through this area. First came a rush order for 750,000 concrete blocks which had to be delivered to Fort Jackson near Columbia between September, 1940 and February, 1941. No sooner was this order completed than one was received for about 4,000 tons of concrete pipe for Camp Croft near Spartanburg, South Carolina. Large quantities of pipe have since been supplied to Fort Jackson, to the Charleston Navy Yard and to other similar projects.

The original block contract was for 190,000 standard 8- by 8- by 16-inch units to be delivered in a 5-month period. This would not have strained the capacity of the plant but before the filling of this order got well under way it was increased to 750,000 blocks. This made it necessary to produce 7,500 blocks daily on a machine with a capacity of about 3,000 blocks in 8 hours. The only solution was 3-shift operation 7 days a week and this schedule was adopted. Then some means had to be found to shorten the curing period so that the usual time lag between manufacture and delivery would be materially reduced. This was accomplished by using high-early-strength cement and curing the blocks for 48 hours in live steam under pressure. In this way the specified 28-day strength was reached much sooner. This record would not have been possible had the company not been provided with curing facilities more than adequate for its ordinary needs. Most of the blocks were used for barracks and warehouse construction but some Superock light-weight blocks were also made for officers' homes.

Day and night operation was also necessary to fill the pipe contracts but the problem then was more one of delivery as Camp Croft is about 100 miles from Columbia. These pipes ranged in diameter from 15 to 48 inches and were used for highway-culvert-construction. After curing the pipes for from 36 to 48 hours they exceeded the strength specifications and could be delivered at once if necessary.

C. A. Wallace, president of the company, was sales manager of another pipe company when in 1935 he put his own plant in operation. He brought with him as his superintendent, B. K. Hiller, who was an inspector for the same company. The original equipment consisted of an old McCracken machine and one of the company's own design. In June, 1939 a new plant was built and the old McCracken machine was replaced by a new one of the same make. The old machine makes only 30- to 48-inch pipes, and 6- to 24-inch pipes are made on the McCracken machine.

Block production was begun in 1938 on a small hand-operated machine which was replaced in the new plant by a Stearns Clipper stripper. Late in 1939 this was replaced by the present Stearns No. 7 Joltcrete machine. The range of sizes made is limited to 4-, 6-, and 8- by 8- by 16-inch blocks and the corresponding half and corner blocks. These have

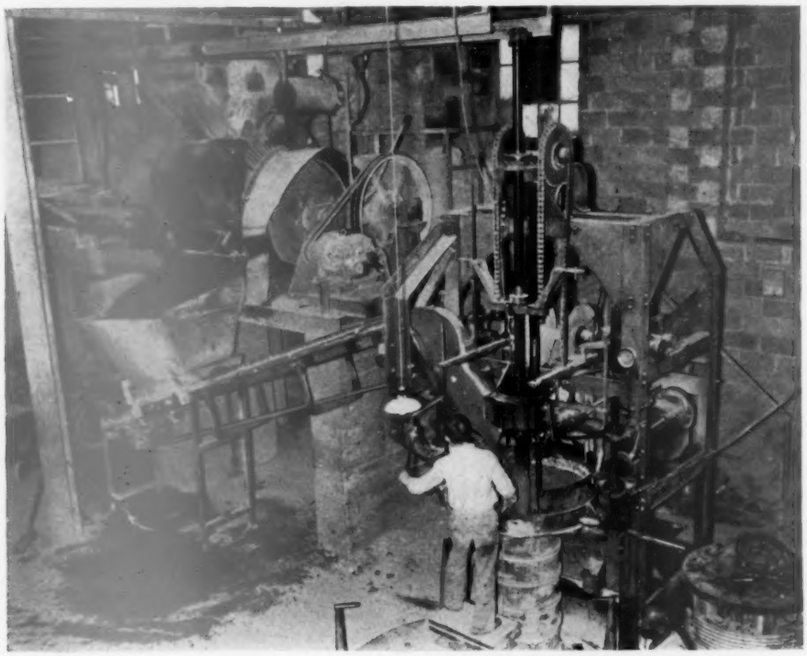
By W. E. TRAUFFER

been used chiefly for back-up and foundations but are beginning to find favor for exposed work. The Superock blocks have been used in several large structures including a library for the University of South Carolina.

The five aggregates used in various combinations in the different products made are fine sand, washed granite screenings, 3/8-inch crushed granite, 3/4-inch crushed granite, and Superock light-weight aggregate. All except the last-named are obtained from local sources. The sand and the three sizes of granite are used in making the larger reinforced-concrete pipe. In making the smaller sizes of reinforced pipe and unreinforced sewer pipe the 3/4-inch granite is omitted. Only the sand and 3/8-inch rock are used in the concrete blocks. These aggregates are hauled from the plants of local producers in a company-owned 10-cubic yard Diamond T cab-over-engine truck. The aggregates for the block machine are elevated into a 2-compartment 25-ton bin. Volume batchers, one under each compartment, measure these aggregates into a 40-cubic foot mixer over the Stearns Number 7 Joltcrete machine.

Another bucket-elevator feeds the aggregates through a selective chute into the four compartments of an 80-ton bin. The desired combination of aggregates is weighed out into a batcher which is equipped with a 4-beam scale. This batcher is suspended from an overhead track and this is rolled off the scale to either side to discharge into the two pipe machine mixers.

The machine used for making large pipe was designed by Mr. Wallace, who holds a patent on a method of regulating the force of the tamper blows. This machine can make 120 feet of 36-inch reinforced pipe in 8 hours and other sizes in proportion. The concrete is fed to this machine by a belt-conveyor from a 16-cubic foot mixer.

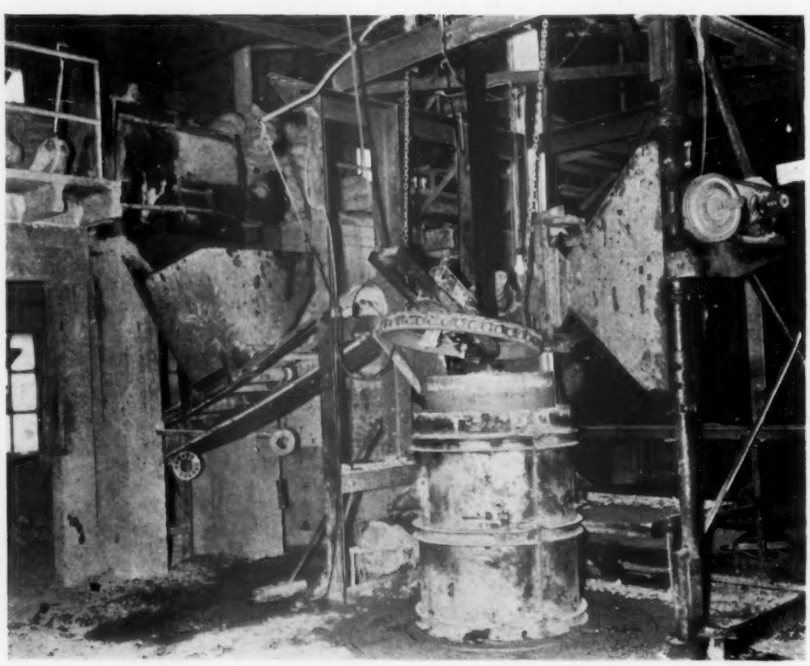


The McCracken pipe machine with mixer and concrete conveyor at left.

Power lift-truck taking a pipe and form from machine to kiln.

The Concrete Pipe Machinery Company McCracken Model H 117 machine is supplied with concrete by another belt-conveyor from a 40-cubic foot Besser mixer. The turntable of this machine has two spaces for reinforced pipe and four for smaller sizes of sewer pipe. Sacked cement is used and this is brought to the mixer floor on a folding conveyor of original design.

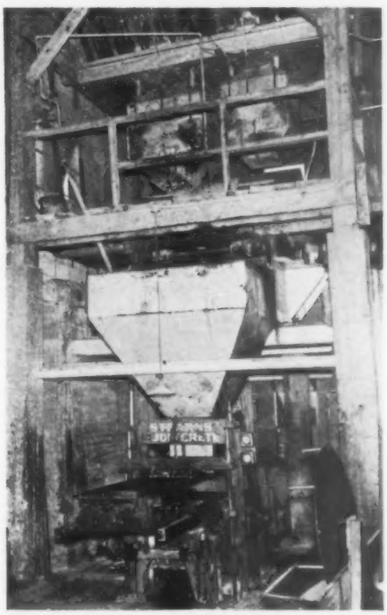
The concrete blocks are stacked on 2-wheel rack cars which are hauled to the kilns and from them to the storage yard by a Vaughan Mighty Midget Motolift gasoline lift truck. This is equipped with a special lift attachment so that it can also



This is the pipe machine designed and built by the company.

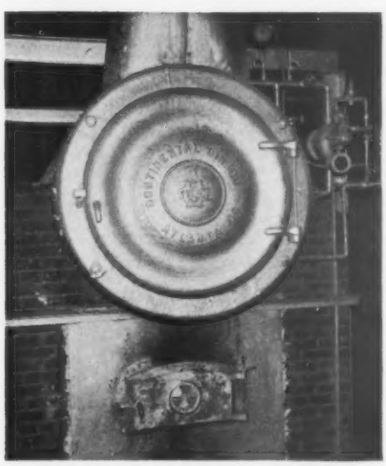
handle the larger sizes of pipe. The smaller pipes are handled by the usual pneumatic - tired off - bearing carts.

There are five 18- by 105-foot steam rooms which are ordinarily used for pipe curing and two 10- by 30-foot rooms for block curing. A 40-horsepower Continental Gin Company boiler equipped with an automatic coal stoker supplies the steam for the kilns. Ordinarily a pressure of 10 pounds is maintained



The vibrating block machine with two batchers above.

in the kilns but this is raised to 20 or 25 pounds in the winter or when there are rush orders. The temperature is maintained at 110 to 140 degrees F. The plant and the kilns are built on concrete blocks and joists. The kilns are also covered with 3 inches of Superock and succeeding layers of sand-cement topping, asphalt and stone which insulate it effectively. All the wire-mesh pipe-reinforcing cages are made on a mezzanine floor in the plant. An electric hoist lifts the 300-foot rolls of wire to this floor, where the cages are formed by a roller. They are then welded by a Wilson 150-ampere electric-arc welder.



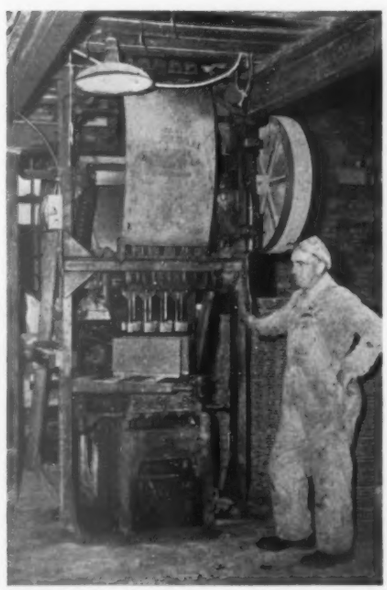
Boiler which supplies curing steam.

The 1-acre yard is used chiefly for concrete-block storage as the pipes are usually shipped soon after they are made. About 30,000 blocks are usually kept on hand. Deliveries of these products are made by four Cummins Diesel - engine - powered flat-bed trucks and a Ford truck which is used for short hauls. Two separate loading stations with Yale & Towne hoists are used to load the pipes on the trucks.

War Plant Stimulates Sales; Adds Tamper

The close proximity of the Kingsbury Ordnance Plant and a huge housing project, Kingsford Heights, adjoining the shell-loading plant has kept a steady stream of products moving from the plant of the La Porte Cement Products Company, La Porte, Indiana in recent months.

The plant, owned by Sherman Cumerford, was established only a few years ago. Recently, a new Multiplex standard 8-bar tamper was installed and this has become the main production unit at the plant. Concrete bricks also are made on a Dunbrick machine.



Mr. Cumerford and his 8-bar temper.

A short while ago Mr. Cumerford moved his gravel plant to a new location along the Kankakee River. The plant, a small dredging operation, produces a large percentage of sharp sand which is ideally suited for making concrete blocks in the La Porte plant. Dump trucks bring in the sand.

Blocks Used in Rantoul USO Building, Houses

The population of Rantoul, Illinois, has nearly tripled since 1940, when Rantoul had 2,300 residents. That has meant new homes and other facilities for the war workers who make up the new population. But building in the face of critical war shortages hasn't been easy. Rantoul business men say that but for the availability of concrete-masonry units some of the emergency construction done in the past two years would have been impossible.

Besides making possible the construction of a $90,000 USO building, a coöperative cold-storage locker plant and several stores, concrete masonry has saved nails, lumber, carpenter labor and oil paint on new homes for war workers. And even with this new construction, homes are still a scarce commodity in Rantoul because of the activity generated by a great military establishment—Chanute Field—and numerous war industries in the area.

The latest house construction in Rantoul has been done by C. R. Miller & Sons, experienced builders of Decatur, Illinois, principally under FHA Title VI. Minimum use of critical materials and assurance that everything needed to complete the work, are prerequisites for projects qualifying for Title VI mortgage insurance.

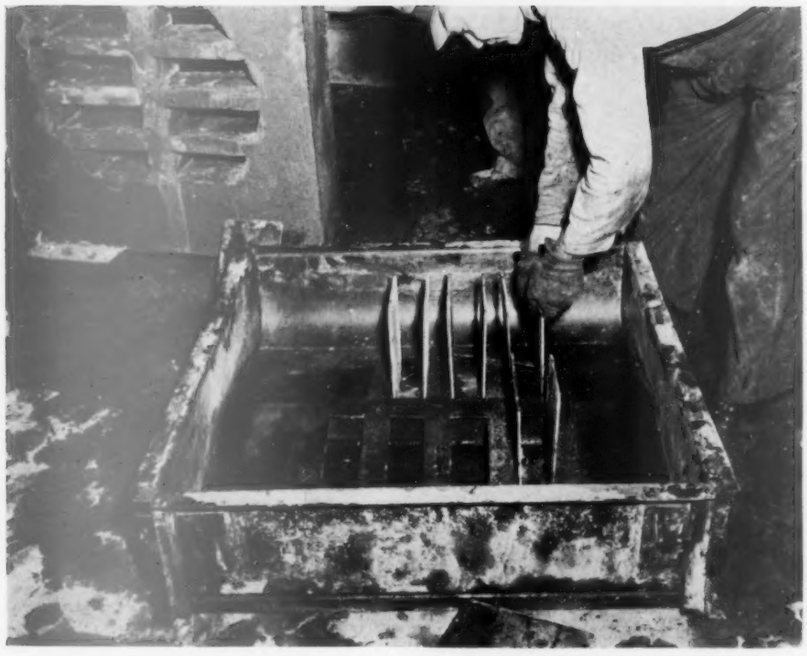
Sixteen of the concrete-masonry houses built by the Miller organization in 1942 are on one street. They all have concrete floors. Exterior walls are finished with two coats of Portland cement paint. Interior walls are plastered.

The concrete blocks used in the walls were manufactured by the Builders Supply Company, of Rantoul.

Correction

The names of D. R. Lynde, president and R. A. Utiger, Denver plant superintendent, were incorrectly spelled in the article describing the operations of the Denver and Kansas City plants of Cinder Concrete Products, Inc., in the November issue.

LEFT—Workmen stripping and assembling steel form used to cast one of the reinforced-concrete gutter-inlet grates, used by the Illinois State Highway Department.



Concrete Specialties Replacing Familiar Iron and Steel Items

WITH iron, steel and other critical materials being used almost exclusively for war manufacture, the concrete-products industry is face to face with the opportunity for replacing many familiar metal items with those made of concrete. Several wide-awake operators have already begun to produce such specialities. The only apparent drawback is that the unprecedented demand for standardized units like blocks, bricks, pipes and tiles is keeping most operators too busy to think about branching out in these newer lines. The labor shortage itself is a "headache" for many plant operators and they are thankful in most cases if they have sufficient help available to keep up with the current demand for masonry units. It is generally felt, however, that now is the time to prove that concrete is as good as, or better than, iron and steel, and that it costs considerably less. If users are won over to concrete now, they will continue to use it after the war, placing the material in a better competitive position than ever before in its history.

Some of the more profitable items which have been developed and which have been merchandised successfully are manhole and catch-basin covers and gratings, tanks of all kinds, sash weights, lawn rollers and shower-bath bases. Bath-tubs of concrete, too, hold considerable promise; another article in this issue deals with the successful production of these on a large scale by an enterprising Californian.

At Champaign, Illinois the Nelsen Concrete Culvert Company is making a variety of these newer special-

Form (at top) and assembled 18-inch catch-basin grates for off-the-highway service.

Gang mold and railway right-of-way markers as they are cast. Two catch-basin covers for highway service in foreground.

ties in addition to producing its regular lines of pipe and block. These include grate-type catch-basin covers, gutter-inlet grates for the Illinois State Highway Department, concrete well casings, precast headwalls for culverts for use at Chanute Field, and railway right-of-way markers.

The gutter-inlet grates are poured in steel forms which were adapted from designs used by the highway department. Only 20 pounds of reinforcing steel is needed for one of these combination units, which replaces the former 420-pound cast-iron grate. A precast catch-basin cover which replaces the Type 8 iron cover used by the highway department employs but 10 pounds of reinforcing steel, the unit replacing a 150-pound cast-iron grate which was formerly standard. Concrete mixtures designed to test about 7,500 p.s.i. are employed, the forms are vibrated while the concrete is being placed and curing is done by steam, the filled forms being covered with tarpaulins during the curing process.

A smaller 18-inch catch-basin grate is also being made for service not subject to highway traffic, such as land drainage. About 2½ pounds of reinforcing steel is used per unit.

Although tongue-and-groove concrete pipes have been used to supplant steel for well casings, they are difficult to keep in permanent alignment. A type originally developed by the Champaign concern for the S. B. Geiger Company of Chicago, which had the contract to provide a new municipal water supply at Normal, Illinois, overcomes earlier objections. It is made in 6-foot sections with a heavy 7-inch wall, the outside diameter being 44 inches and the inside 30 inches. Eight 2½-inch iron pipes are cast in the walls, being spaced at regular intervals lengthwise, about 15 inches apart on centers. These are to hold the aligning rods which keep the casing in a permanent perpendicular position.

Railway right-of-way markers are cast in gang molds, and smaller items, such as bases for bottled-gas holders and flagstones for walks (sold to landscape gardeners) are poured intermittently, usually at the close of a day's work, using up the surplus concrete from the pipe yard.

According to E. P. Shapland, general manager, the concrete specialties which replace cast iron can be sold at a good profit when priced at about half the amounts usually commanded by the iron items.

One of the heavy well-casing sections referred to in the accompanying text.

Union Builds Concrete Demonstration House

A modern four-room concrete-masonry house is the contribution of American Federation of Labor members in Detroit toward relieving a critical shortage of livable homes for war workers. The house was financed, built, and widely advertised by A. F. of L. members in Detroit and Wayne County as a demonstration of what skilled building trades mechanics can accomplish in the small house field, using very little steel or other critical materials needed for war purposes.

The fact that their model house demonstrated a considerable saving of critical materials was so much a matter of pride with the A. F. of L. members that this feature of the concrete construction was especially commented on by the *Detroit Labor News*, in a recent issue, which, said in part:

"Besides the quality of the concrete masonry and the resulting high quality of the Federation Home, the use of concrete blocks saves a large amount of scarce materials vitally needed for war purposes, notably lumber and steel. The saving in lumber is obvious, almost 6,000 board feet being replaced by the concrete block. Equally important is the saving in steel, for nails and I-beam in the basement.

"There is no scarcity of concrete materials, nor does the manufacture or transportation of the concrete masonry conflict with production for war needs. Cement is delivered to the block plants by a short haul, while the sand and gravel is produced in adjoining counties with equally short-haul transportation. Thus it provides a new housing unit for a war worker with the minimum use of critical materials.

"By using concrete blocks to save the steel in the basement I-beam, the owner has the added advantage of an extra room, partitioned off from the heating and laundry quarters, for a recreation room or home-shop workroom."

The actual saving in steel was 200 pounds of nails and 600 pounds of structural steel which would have been required but for the use of a load-bearing partition of concrete masonry in the basement.

"The concrete blocks were produced by various members of the Detroit Concrete Products Association. These blocks are tested by the Detroit Building Department and meet the requirements of the city building code for all residential and commercial structures."

General view of "Tyltub" operations showing the concrete bathtubs in various stages of completion on the production lines. J. W. Thornton, in foreground, is in charge.

Shortage of Critical Materials Puts Concrete Bathtub in 1942 Spotlight

● Now, when the diversion of much of the nation's productive effort to the winning of the war is limiting the flow of goods to ordinary civilian uses, many opportunities await those who can find suitable unrestricted substitutes for products requiring priorities. This article tells how two alert Californians developed a concrete bath-tub when it became apparent that enameled iron tubs would soon be unavailable.

THE shortages which are becoming more and more a part of our everyday existence as a result of our tremendous war effort may turn out to be blessings in disguise as they are forcing us to find new ways of doing things and new material to make things from. Most of these new methods and materials are, of course, substitutes, but many others will undoubtedly turn out to be improvements on the originals. One which would seem to have a good chance of surviving is the tile-lined concrete bathtub which has recently appeared in several variations. These tubs owe their existence to the fact that a high priority rating is now necessary for the purchase of the enameled iron tubs now remaining. The manufacture of the metal tubs was stopped on September 1 of this year and they are no longer included in the specifications for defense housing. No priority is necessary to purchase a concrete tub as each one contains only 5 pounds of metal.

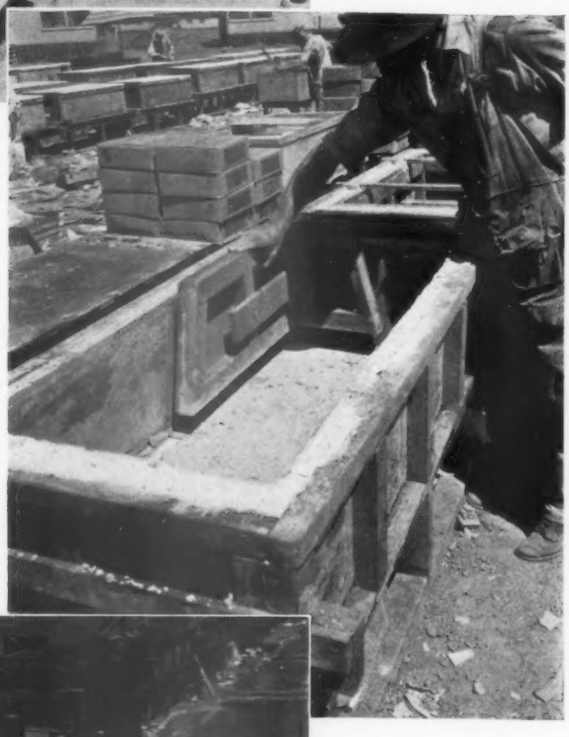
Peter D. Dolan and J. W. Thornton had been tile contractors for over 15 years and from time to time had experimented with prefabricated tile-lined stairways, fish ponds, and similar sidelines. Some thought had been given to the manufacture of tile-lined concrete bathtubs but nothing was done about it until early this year when the metal shortage became apparent. The next step was to get the design of this tub approved in Washington and this was soon accomplished.

Operating as Peter D. Dolan, Tyltub Manufacturing, 24 Twelfth Street, San Francisco, the first order was obtained through the National Housing Authority there. This was for 400 tubs for "demountable" or temporary homes for Navy-yard workers in Vallejo. The results were so satisfactory to all concerned that another order for 2,550 tubs soon followed for war workers in the vicinity of San Diego. Of these, 1,200 are going to the Linda Vista Housing Project and the others to smaller projects at Chula Vista. Point Lomas and other points near San Diego. All these tubs are going into "duration" houses which are being added to several thousand permanent houses built in 1941.

The manufacturing yard is at the Linda Vista project from which point the tubs are distributed to the other locations. Actual manufacture was begun late in June and the original order will be completed before the year is over. On a good day 40 tubs are made with a crew of 25 men.

The first tubs made were poured upside down but it was soon found that production was being slowed up

In the view at the left, the reinforcing mesh has been placed in the form and the concrete for the bottom of the tub is in place and being troweled by one of the workmen.



In the next step (right) the sides have been poured and a workman is seen stripping the inner forms. The glazed tile lining will be cemented into position next.

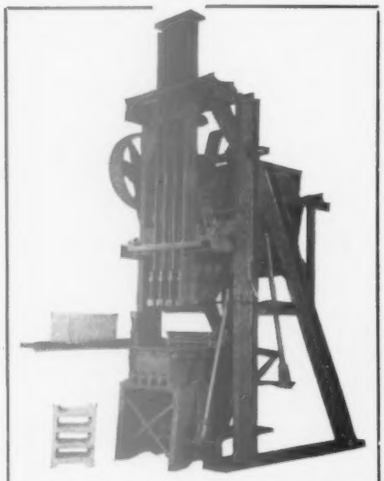
LEFT—One of the concrete bathtubs complete and ready for installation. The company has delivered or has unfilled orders for nearly 3,000 of the tubs.

by the long wait necessary before the tubs could be turned over for tiling. A new type of form was then devised so that the tubs can be poured upright and the tile laid on the following day. Another day is allowed for the tile to set and the finished tubs are hauled away at the end of the second day.

Plywood forms in two sections are used and these are oiled before each use. With care each form can be used for dozens of tubs. The outer form consists of the four sides and the bottom, and inside this is placed a 14-gage, 2-inch-mesh wire reinforcing basket. Concrete is then poured to a depth of 2 inches and this is given time for a slight initial set before the inside form is put in place. This form consists of four sides only and to it are attached the wooden cores, which make the openings for the tub overflow and the other plumbing connections. After the sides are poured, single ¼-inch reinforcing rods are imbedded on all four sides. Portable electric vibrators were used at one time but hand tamping has been found to be more satisfactory.

The finished tubs are 5 feet long, 27 inches wide and 16 inches deep outside and 4 feet 6 inches long, 22 inches wide and 14 inches deep inside. This tub has vertical sides and the bottom has a ¼-inch slope in its full length for drainage. Pomona Space Rite white ceramic glazed tile is used for lining the tubs, standard sizes of tiles being used except for the drains, the overflow and one of the corners. Cove corners with a ⅜-inch radius are used.

The concrete used consists of a 1:3 mix of standard Portland cement and Haydite lightweight aggregate and this is prepared in a small portable gasoline-powered mixer in ½-sack batches. No admixtures are used. The mix is rather wet but the resulting concrete is absolutely waterproof. According to Mr. Thornton, who is in charge of production at Linda Vista, the Haydite aggregate is chiefly responsible for this. As evidence he pointed out that a defective unlined tub had been used as a tile-soaking bath for months and showed no signs of seepage. The Haydite concrete also sets more rapidly than sand-and-gravel concrete and its lighter weight is another advantage. As this aggregate is shipped from the San Francisco Bay area, nearly 500 miles, its advantages must indeed be important to offset its much greater cost. A complete tub weighs about 450 pounds, somewhat more than the enameled-iron tubs originally sched-



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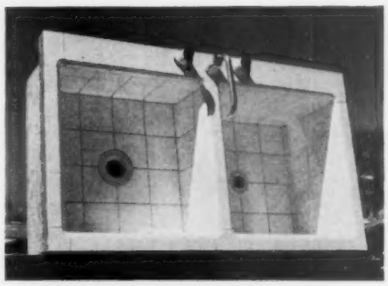
G. M. Friel, Manager. Columbus, Ohio

uled to be used in these homes and costs about the same.

The cost is a primary factor in the design and manufacture of the tubs for this particular project and for this reason all frills are omitted. Only the inside and the top surfaces of each tub are lined and the exposed face is smooth-finished concrete which can be painted any desired color. If manufactured for private sale or within less exacting price limitations Mr. Thornton believes that these tubs can be made as attractive as any other types on the market. With larger-radius corners, a tiled exterior face, and an unlimited selection of colors and designs, tubs can be made to fit any pocketbook or taste in interior decoration. The joints between the tiles are an advantage, he says, because although carefully pointed to give a nearly smooth surface, they do provide enough friction to reduce the possibility of those falls which occur while bathing and are responsible for an appalling number of deaths and injuries annually.



Combination sink and laundry tray with fittings in place.

Application has been made for a patent on this method of manufacture of all portable tile-lined objects such as sinks, tubs, wash bowls, shower stalls, etc. According to Mr. Thornton, production may soon begin on a combination kitchen sink and laundry tub. Several experimental models have already been made and they seem to offer as good possibilities as the tubs.

Boichot *(from page 74)*

Butler portable concrete hopper. The use of this hopper, which is mounted on pneumatic tires for easy transport to the job, speeds truckmixer operation by eliminating "waiting time" on the construction site.

Don Boichot is in charge of the ready-mixed-concrete and concrete-brick plants, and also serves as general sales manager for the sand-and-gravel company.

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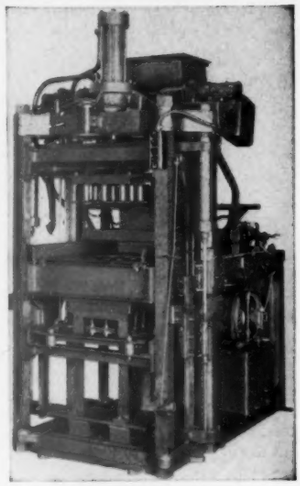

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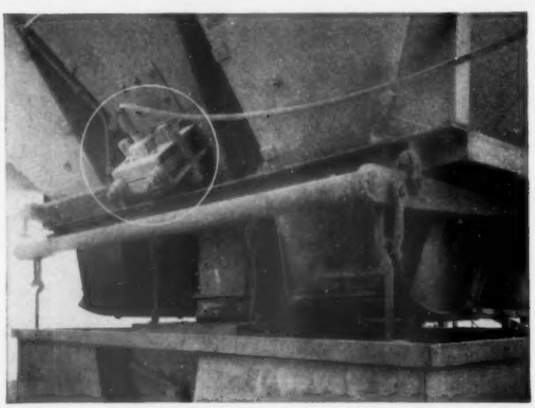

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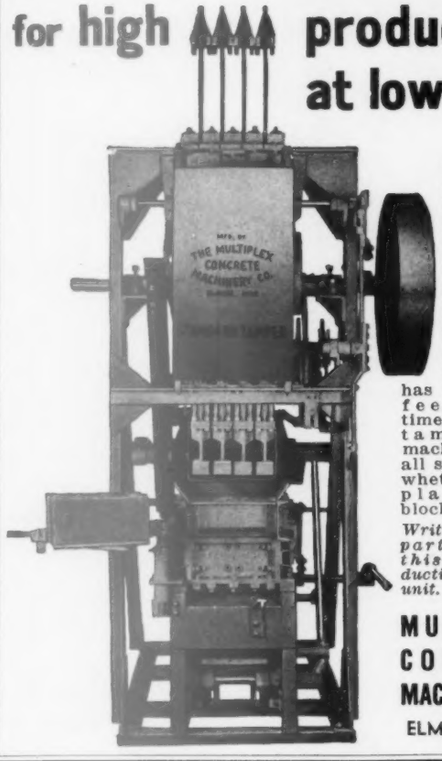

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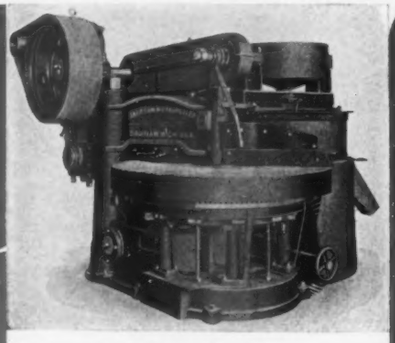

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AMERICAN Crushers deliver top tonnage continuously. 10 to 100 tons per hour depending on the products.

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YOU can save time and money by efficient use of hard surfacing electrodes. Bergstrom Electrodes are the choice of so many welders because they are easy to use. They are slag-free and therefore eliminate much chipping and wire brushing. Six types—each designed to match a specific need for resistance to abrasion or corrosion. Write us for full information.

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HARD SURFACING ELECTRODES

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To consider the many advantages gained by installing Simplicity Gyrating Screens.

To check the many features of the Simplicity Gyrating Screen; such as the solid counter-balanced shaft; resilient corner supports, double crowned screen decks, and many others.

LOOK

At the many successful installations of Simplicity Gyrating Screens and observe their capacity and screening efficiency.

At the finished details of construction where nothing has been omitted to make the Simplicity Gyrating Screen a complete job.

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To all arguments pro and con; then buy the screen with the lowest ultimate cost per ton of material handled, which will be the Simplicity Gyrating Screen.

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DURAND MICHIGAN

Extra Heavy, Olive Color

SLICKER COATS

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EAGLE Washers are indispensable in supplying clean, "all-specification" aggregate for rapidly expanding industrial, highway and military requirements.

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Send for our Bulletin No. 41 describing the Eagle line of Washers and Dewaterers. "A machine for every problem."

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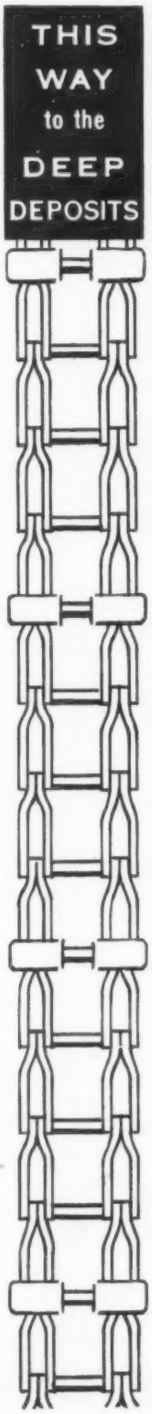

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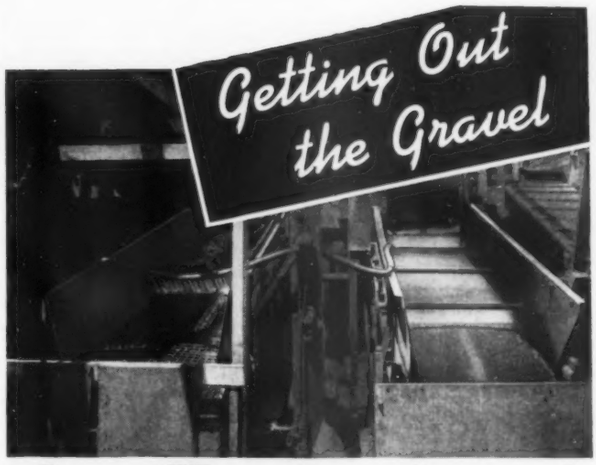

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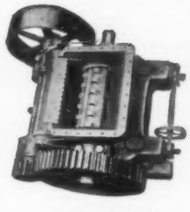

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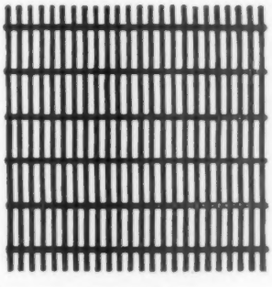

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Each Length with Couplings Attached

I.D. Size	Length	Price per Length
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	50 "	12.00
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¾"	25 "	7.50	2.50 "
	50 "	15.00	2.50 "
1"	25 "	10.00	3.50 "
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20 Ton to 25 Ton Locomotive Crane.

20 Flat Cars—15 Gondola Cars.

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3 Portable or Semi-Portable Complete Stone Crushing Plants—200 to 400 Ton Cap.

1—60 to 80 Ton Switching Locomotive.

3—3 Ft. or 4 Ft. SYmons or Equal Cone Crushers.

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2000 H.P. Diesel Power In Large Unit.

Will Consider Any Size From 200 H.P. to 2000 H.P.

CAN USE EQUIPMENT ANY PLACE IN NORTH AMERICA

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20" GYRATORY CRUSHER USED ONE YEAR ON SLATE

1—20" Allis-Chalmers Superior McCully Gyratory Crusher, feed opening 20" wide, capacity 125 t.p.h. on 3" setting, 275 t.p.h. at 5½". Shop No. 8311. With or without 125 H.P., 3/60/440 volt slip ring motor and controls.

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1—22"x50" Champion, all steel frame. Also an assortment of smaller sizes.

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1—36" d.x16" Sturtevant Mill Co.
2—40"x16" Colorado Iron Works.
1—42"x16" Allis-Chalmers Anaconda type.
1—30"x30" Jeffrey Single Roll Crusher.

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27' c/c—14x7; 29' c/c—14x7; 40'—7x5; 42'—10x6; 44'—7x5 belt; 70'—16x8; 90'—16x8; 3-100'—7x5, belt; all of these steel encased.

BELT CONVEYORS

5—18" Steel Frame in 15' sections, 4" cross channels, 6" long channels. Link-Belt troughing and return idlers, with anti-friction bearings; 50', 85', 100', 125', 150' centers.
1—24"x105' with wood frame.
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3—18" Sandvik flat belt Conveyors, motor driven, with steel framework; 2—60' c/c; 1—80' c/c.

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1—24"x65' c/c Jeffrey Steel Pan Conveyor.

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3'x20', 5x26', 5x30', 6x24', 6x50'.

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4x30', 4x40', 8x80', 10x175'.

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1—10' dia. Sturtevant Mill Co.
2—14' dia. Gayco.

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2—7'x24' Smidth iron lined.

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2—5 roll high and low side, also No's. 0000, 1, 3.
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C-P 14x12", 529' belted 100 hp slip ring motor.
Schramm 4 cyl. 360' V drive to 60 hp AC motor.
I-R 275' Waukesha engine, on skids.
I-R 44' vertical hopper cooled, belted.

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60' continuous elevator 8" buckets, Ley Bushed chain.
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40' continuous elevator 30" buckets, 2 strand chain.
35' continuous elevator 18" bucket, 2 strand chain.
40' elevator 18" round bottom buckets, No. 8440 chain.
55' elevator 12" malleable buckets, Ley Bushed chain.
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40' elevator 8" malleable buckets, H82 chain.
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Malleable, Salem, Continuous steel buckets, 5" to 30".
Selected gears, sprockets, drive and elevator chain.

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Williams Semi-Vulcanite Hammer Mill, No. 2.
Harosh No. 1½ Hammer mill, for light work, 8"x8" opening.
Allis-Chalmers 42"x16" crushing rolls, type B.
Crushing roll with teeth, 24"x24".
American Standard double crushing rolls, 36"x30".
American Standard Disintegrator, 18" & 24"x30".

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1000' 42" conveyor belt, 6 and 7 ply.
445' 30" conveyor belt, 6 ply.
86' 54" new conveyor belt, stepped 5-7 ply.
78 Robins 42" trough idlers, style 105.
25 S-W 30" trough idlers, type Y.
75 selected head and tail pulleys.
200 drive pulleys and fly wheels, 6" to 8'.
Cotton belt 12", 14", 18", 30", 48" in width.
Portable Scoop flat belt conveyor, 14"x20'.

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5 revolving screens, 2x8, 2x9, 30"x12', 3x8', 4'x16'.
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2 Telsmith No. 7 Sand Dewatering Tanks.

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75 hp Fairbanks-Morse Diesel Engine, YV, 300 rpm.
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1 Sprague 2½ ton AC electric vertical winch.
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Northwest Crane, ⅝-Yd., Model 2, Serial #2583 with 40-ft. Boom.

General Shovel, ⅝-Yd., Serial #1075.

Michigan Shovel, ⅜-Yd., Model AM, Serial #114.

Above machines located our yard

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1—¾ Yd. Northwest Shovel
1—¾ Yd. P. & H. Shovel, Hydraulic Controls
2—⅝ Yd. General Shovels and Cranes
1—½ Yd. P & H. Shovel
1—⅜ Yd. P. & H. Shovel
1—⅜ Yd. Michigan Shovel
1—½ Yd. P. & H. Shovel Attachment
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1—Model 212 Diesel Grader
1—Model D-4 Caterpillar Bulldozer
1—Model D-2 Caterpillar Bulldozer
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1— 9"x36" Wheeling Jaw Crusher
1—24"x20" McLanahan Roll Crusher
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1—Model 32 Telsmith Gyratory Reduction Crusher
1—Complete Grushing Plant consisting of:
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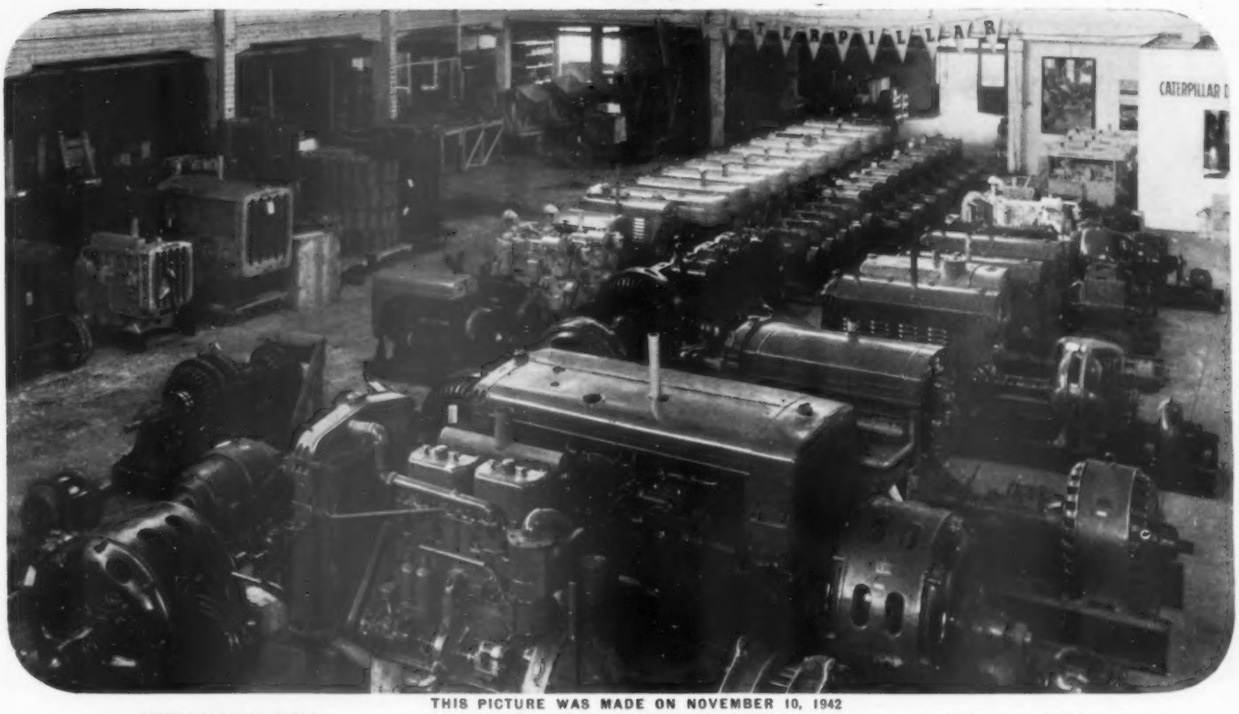
10-B Telsmith Gyratory Crusher
36" Telsmith Gyrasphere Crusher
Elevators, Conveyors, Screens, Feeders, Motors, Compressor, Scales, etc.
1—42"x36" Type B-2 Jeffrey Ball Bearing Swing Hammer Pulverizer

BLUE BALL MACHINE WORKS
Blue Ball, Pennsylvania



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1—**TRACTOR AND 'DOZER**, Model Forty "Caterpillar" Diesel Tractor, equipped with LaPlant—Choate Bulldozer .....

1—**PORTABLE BELT CONVEYOR**, Model BT14, Chicago Automatic with 14" belt with cleats, 20 feet long, powered by gasoline engine, rebuilt $565.00

1—**LOCOMOTIVE**, Plymouth, 8-ton, 36" gauge, Model BTU, powered by gasoline engine. $2250.00

1—**LOCOMOTIVE**, Whitcomb, 8-ton, 36" gauge, Type MA, powered by gasoline engine. $2100.00

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1—**TRACTOR**, Crawler Type, Model Twenty-two "Caterpillar", gasoline powered, rebuilt. $1250.00

1—**ROAD PUMP**, C. H. & E. Model No. 11 Triplex Road Pump, powered by 4 cylinder Waukesha, Model V121H Gasoline Engine; mounted on 4 steel wheels.....$750.00

1—**CONCRETE MIXER**, Model No. 10, DDKX Jaeger, equipped with water regulator, power loader, powered by 4-cylinder Gasoline Engine, mounted on 2 pneumatic tires..$950.00

1—**CRANE or CLAMSHELL**, Model 206 P & H, ¾ yd. capacity, powered by 4 cylinder Gasoline Engine, with ¾ yd. clamshell bucket $3000.00

1—**CONCRETE MIXER**, Jaeger 5LKP, one bag, equipped with loading skip shaker and tip over water tank, mounted on 2 pneumatic wheels.$525.00

1—**TRACTOR AND 'DOZER**, Model Fifty "Caterpillar" Gasoline Tractor, equipped with Euclid Hydraulic Bulldozer $2000.00

1—**TRACTOR**, Crawler Type, Model TD40, International, 4 cylinder Diesel.....$1875.00

1—**TRAILBUILDER**, Model R8, LaPlant-Choate Hydraulic, for "Caterpillar" Model D8 Tractor. $1000.00

2—**SHEEPFOOT ROLLERS**, Double Drum, with feet cleaners and swivel tongue and hitch. EACH $800.00

1—**SHOVEL**, Model 32B Bucyrus-Erie, 1 cu. yd. capacity, powered by gasoline engine; in operating condition $9150.00

1—**PULVERIZER**, Model ER20 Day 6" x 14" feet opening; roller bearing, rated capacity 5 to 8 tons per hour, rated HP required 40; in operating condition $300.00

1—**PULVERIZER**, Model 2XA Gruendler, practically new $950.00

1—**JAW CRUSHER**, Model 1040 Good Roads, roller bearing, overhead eccentric type

1—**GENERATOR PLANT**, Diesel Electric, 225 HP, 6-cylinder Buckeye Diesel Engine, direct connected to 187 KVA Generator, 3 phase, 60 cycle, 2480 volt, complete with switchboard and starting equipment for Diesel Engine. This is a complete power plant in A-1 condition located in Kentucky $9860.00

1—**CONCRETE PAVER**, Koehring Model 27E, with boom and bucket, just finished a job. "A bargain" $1995.00

1—**CONCRETE PAVER**, Model 27E Koehring, complete with boom and bucket, powered by gasoline engine $4000.00

2—**POWER CONTROL UNITS**, Garwood, double drum, heavy duty cable controlled, for use with Allis-Chalmers HD14 Tractors. EACH $590.00

1—**SAW RIG**, Steel Table Type, C. H. & E., Model HB, Serial No. HB1044, powered by Wisconsin AE 3.7 HP air cooled engine, 3 V-belts, 2 combination 12" saw blades..$208.00

CENTRIFUGAL PUMPS, Jaeger, 2 inch, 3 inch, 4 inch.....PRICE ON APPLICATION

1—**CRAWLER WAGON**, LaPlant-Choate, 10 yd. capacity, hydraulic control, side dump, rock type with tractor pump.....$1850.00

1—**SCRAPER**, Austin-Western, 5-yard capacity, cable controlled, mounted on 6 pneumatic tired wheels .....

1—**SCRAPER**, Bucyrus-Erie, 4½ yard capacity, cable controlled, mounted on 6 pneumatic tired wheels. New tires.....

1—**DIESEL POWER UNIT**, New Model KI600 Cummins, 6-cylinder, 200 HP Diesel..$6850.00

ELECTRIC GENERATOR SETS

1—**GENERATOR SET**, Rebuilt, 100 KW Westinghouse Generator, 3 phase, 60 cycle, 240 volt with Exciter and Rheostat, direct connected to new Model KI600, 6-cylinder Cummins Diesel Power Unit, all mounted on steel channel base. We can furnish two like above—10 day delivery $8547.00

1—**GENERATOR SET**, Rebuilt, 100 KVA Westinghouse Generator, 3 phase, 60 cycle, 240 volt, with Exciter and Rheostat, direct connected to new Model KI600 Cummins Diesel, 6 cylinder Power Unit, all mounted on steel channel base. 10 day delivery.....$8392.00

1—**GENERATOR SET**, Rebuilt, 90 KVA Electric Machinery Co. Generator, 3 phase, 60 cycle, 230 volt with Exciter and Rheostat direct connected to new Model 6DH-1611, 6 cylinder Buda Diesel Power Unit, complete with electric starter and battery. All mounted on steel channel base.—10 day delivery.....$7644.00

1—**GENERATOR SET**, Rebuilt, 70 KVA General Electric Generator, 3 phase, 60 cycle, 230 volt with Exciter and Rheostat, direct connected to New Model 6DH691 Buda, 6 cylinder Diesel Power Unit. All mounted on steel channel base. Electric starter and battery. 10 day delivery $4272.00

1—**GENERATOR SET**, Rebuilt, 60 KVA Fairbanks-Morse Generator, 3 phase, 60 cycle, 230 volt, with Exciter and Rheostat direct connected to New Model 6LD909, 6 cylinder Buda Diesel Power Unit, with electric starter and battery. All mounted on steel channel base. $4679.00

1—**GENERATOR SET**, Rebuilt, 56.3 KVA General Electric Generator, 3 phase, 60 cycle, 220 volt with Exciter and Rheostat, direct connected to rebuilt Model DS800 "Caterpillar" Diesel Power Unit. All mounted on steel channel base. All in stock can ship in 5 days. Sell or rent?.....$3655.00

1—**GENERATOR SET**, Rebuilt, 40 KVA Allis-Chalmers Generator, 3 phase, 60 cycle, 220 volt, with Exciter and Rheostat direct connected to New Model LAE Case 4 cylinder gasoline power unit. All mounted on steel channel base. Gen-on order. Engine in stock.....$1916.00

1—**GENERATOR SET**, Rebuilt, 45 KW General Electric Generator, 3 phase, 60 cycle, 2300 volt with Exciter and Rheostat, direct connected to new Model LO525 Buda, 6 cylinder gasoline engine with electric starter and battery. All mounted on steel channel base. (Can reconnect Generator for 230 volts). Can also furnish switchboard with AC voltmeter, amp. meter and switch at additional cost. 10 day delivery $2496.00

2—**GENERATOR SETS**, Rebuilt, 30 KVA General Electric Generator, 3 phase, 60 cycle, 240 volts with Exciter and Rheostat, direct connected to new Model 4600 G "Caterpillar" 6-cylinder gasoline power unit. All mounted on steel channel base.....$2709.00

The above engine can be equipped to operate either on natural gas or gasoline.—10 day delivery.

1—**GENERATOR SET**, Rebuilt, 22.5 KVA Northwestern Generator, 1 phase, 60 cycle, 110 volts, with Exciter and Rheostat direct connected to new Model JXA Hercules, 6 cylinder Gasoline Power Unit with electric starter and battery. All mounted on steel channel base.—10 day delivery.....$1585.00

1—**GENERATOR SET**, Rebuilt, 7½ KW ECK Generator, 3 phase, 60 cycle, 440 volt with Exciter and Rheostat direct connected to Model F 162, Continental, 4 cylinder Gasoline Power Unit, all mounted on steel channel base. All in stock. 7 day delivery.....$1094.00

9—**GENERATOR SETS**, New Model MG6 Master Gasoline Electric, 1 phase, 60 cycle, 115 volt. Powered by 4 cylinder gasoline engines. Ready to ship ..... EACH $895.00

DIRECT CURRENT SETS

1—**GENERATOR SET**, Rebuilt, 7.5 KW direct current, Westinghouse Generator, 125 volts, direct connected to new Ford Ferguson, 4 cylinder gasoline power unit, complete with electric starter and battery. All mounted on steel channel base. Ready to ship.....$864.00

1—**GENERATOR SET**, Rebuilt, KW 5, Willey, direct current Generator, 125 volt, with Rheostat, direct connected to Model F162, 4 cylinder Continental Gasoline Power Unit. All mounted on steel channel base. Ready to ship. $842.00

3—**LIGHT PLANTS**, Rebuilt, Koehler, 1500 Watt, powered by 4 cylinder gasoline engine, 1 ready to ship—2 ready in 5 days.... EACH $250.00

2—**GENERATOR SETS**, Rebuilt 12.5 KW Allis-Chalmers direct current Generator, 125 volt, with Rheostat direct connected to new Ford Ferguson, 4 cylinder gasoline power unit with electric starter and battery. All mounted on steel channel base. 2 ready to ship in 5 days $939.00

WE HAVE A LARGE STOCK OF RENTAL EQUIPMENT CONSISTING OF TRACTOR AND SCRAPER OUTFITS, BULLDOZERS, SHOVELS AND CRANES, AIR COMPRESSORS, WAGON DRILLS, CONCRETE MIXERS, PUMPS, SHEEPFOOT ROLLERS, ELECTRIC GENERATOR SETS. LEASES ARE EXPIRING DAILY ON THIS EQUIPMENT AND WE INVITE YOUR INQUIRIES.

800 WEST MAIN

ROY-C-WHAYNE SUPPLY COMPANY.

LOUISVILLE, KENTUCKY

CONCRETE EQUIPMENT

B.K. 325 bbl. Bulk Cement Bin, weigh batcher.
B.K. 50 ton, 2 compt. bin with weigh batcher.
Fuller Kinyon bulk cement unloader, portable.
Fuller C40 rotary air compressor, electric.
Rex Model 190 Pumpcrete, 1000' pipe, etc., gas.
Rex Model 200 Pumpcrete, 750' pipe.
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Smith 27E Paver with 40' Tower.
Jaeger 4 yd. Mixers on Mack Trucks.

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Allis Chal. Model L Tractor with 12' bulldozer.
Allis Chal. Model K Tractor with bulldozer.
Cletrac Model 80 Diesel Tractor with 12 yd. scraper.
Derrick Boat equipped with 20 ton Wiley Whirley, 100' bm., 12x12 Steam Hoist. Hull 33x114x10'.
1—Butler 16 cu. ft. Asphalt Pug Mill.
2—Steel Stiff-leg Derricks, 10 tons, 100' bm.
2—Steel Stiff-leg Derricks, 15 tons, 110' bm.
Allis-Chalmers cent. pump, electric, 3500 GPM, 50'.
Worthington 8" cent. bronze impeller, elec. port.
Dredge Pump 10" FH. cent. 200 HP AC motor.
Sullivan Compressor 1051 cu. ft., F.-M. engine.
American Compr. 425 CFM, 50 lb. pressure, elec.
Vertical Boiler 50 HP A.S.M.E., 125 lb. pressure.

CRUSHERS—CRUSHER PLANTS

Gyratory crushers: K.V.S., 30, 37-S, 49; Telsmith 32, 8A, 8B; Traylor 8"; McCully 13", 8", 6".
Jaw: 6x12, 9x16, 10x20, 14x24, 12x26, 13x30, 15x30, 16x32, 56x84.
Complete Rock Crushing Sand & Gravel Plants.

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2 yd. Hayward Clamshell, rehandling.
1½ yd. Hayward Clamshell, rehandling.
1½ yd. Williams Clamshell, rehandling.
2—½ yd. Haiss rehandling clamshell.
¾ yd. Haiss rehandling clamshell.
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20—Battleship Buckets, 2 to 3 yds.

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Bucyrus Erie Model 50B, 2 yd. comb. Shovel-Crane.
Marion Model 480, 2 yd. Steam Shovel.
Northwest Model 105 Crane, 60' boom.
Universal 7½ ton Truck Crane, pneu. on Mack.
Universal 6 ton Truck Crane, solid tires, Mack.
Bucyrus-Erie Model 1030 electric tunnel shovel.
Marion Model 32 Steam Shovel, 1½ yd. cap.
Ind. Brownhoist 10 ton Cat. Crane, gas.
Brownhoist 5-7½ ton Crane, gas.

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Vulcan 8 ton, std. gauge, gas.
Plymouth 8 ton, std. gauge, gas.
Whitecomb 4½ ton, std. gauge, gas.
2—Vulcan 6 ton, gas, 36" gauge.

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AIR COMPRESSORS
INGERSOLL-RAND 310' portable air compressor, overhauled.

CRUSHERS
ALLIS-CHALMERS 12x24 Improved Blake Type Jaw, excellent condition.
CASE 10x20 Jaw.

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10-TON GUY DERRICK, 70' boom, 85' mast, 16' bullwheel, excellent condition.

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2—20-TON, hard rubber, good tires.

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NORTHWEST No. 2 shovel, overhauled.
P & H 300A ⅝-yard Crane, 35' boom, overhauled.

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CONTINENTAL 5-Yard pneu. tires.

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48"x18' Screen, scrubber, 5 conveyors, twin screw washer, sand tank; pump with 1200 ft. 6" pipe, all gas drive; good condition.

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SALES OFFERINGS

1—½ yd. UNIVERSAL-LORAIN Crawler Crane, 32' boom with ⅜ yd. WILLIAMS D/L bucket.
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1—75A LORAIN Shovel (1¼ yd.).
1—Model 77 LORAIN Diesel Shovel.
1—No. 2 NORTHWEST Shovel Front.
1—9x36 UNIVERSAL Jaw Crusher.
2—55 ton BALDWIN Steam Switching Engines. Std. gauge.
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1—3x6 NIAGARA triple deck vibrating screen.
1—2½ yd. JAEGER truck mixer.
1—6' KENNEDY sand classifier.
1—GALION 10-ton 3-wheel gas roller.
1—Model 42-A BARBER-GREENE loader.

We have portable and stationary stone and gravel plants available Also heavy duty construction equipment, including EUCLID trailer hauling units. Write for complete details.

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SPECIAL BARGAINS

20 ton Link Belt 8-wheel locomotive crane, MCB, code boiler, 50' boom, just overhauled.

Two—Erie crawler ¾ yard steam shovels. 1 yard shovel attachment. Will fit any Northwest Model 104 or 105.

Buckeye Trencher, will dig 28" wide by 7½' deep.

Buckeye Model D crawler gas backfiller with scraper bucket.

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Worthington Full Diesel Engine, vertical, 240 HP, 4 cylinder, 2 cycle, 327 RPM, direct connected to General Electric 219 KVA Generator, 2300 volt, 3 phase, 60 cycle Switchboards.

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Complete Sand and Gravel Dredge consisting of:
1—250 H.P. Fairbanks-Morse Marine type 5 cylinder Diesel Engine.
1—12" Suction 10" Discharge American Manganese Counterflow Pump.
All necessary Suction Pipe and Hose.
1000' Discharge Pipe.
4 Pontoon Steel Hull Boat 24'x15'.
All necessary Priming Pumps, Pipes, Oil Pumps and Light Plant.
This Dredge in perfect condition and operating every day.
Dredge bolted together and can be dismantled and moved with minimum expense.

WATERS & McCRARY SAND & GRAVEL CO.
Columbus, Mississippi

10" & 12" Dredges with 250 & 300 HP Motors.
Gyratory Crushers, 12x46" & 8" T Traylor.
Nos. 6, 7½, 9, 10K & N-18 Allis Chalmers.
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Barber Greene, Haiss & Nelson Bucket Loaders.
P & H Model 300A Gas Dragline, ⅝ yard.
Bucyrus Class 14, Electric, Cat Mounted, 2 yard.
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150 HP & 350 HP Bruce MacBeth Nat Gas Generator Sets.

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BINS, 60 yd. and 280 yd., 2 compartment, steel, with batcher.
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CRUSHER, American Ringmill 15S.
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PUMPS, 2"—3"—6" centrifugal.
SCRAPER, 12 yd. Austin-Western.
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SHOVEL, 1—1¼ yd. Lima Model 101.

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1 only Allis Chalmers Anaconda Roll Crusher, Size 54" dia. x 24" wide, rolls fitted with manganese steel shells approximately 4½" thick, complete ready for operation.

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24—Narrow gauge side dump mine cars
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Fairbanks single drum winch, gasoline engine
100—ton Railroad Scale, 42' (Fairbanks)

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USED STEEL
5" x 5½"
ANGLES

¼" Thick—10' Lengths
10,000 Ft.—1" Pipe

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A REAL PURCHASE OPPORTUNITY!
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6½-7½ yard, Bucyrus 320-B; R. R. Trucks
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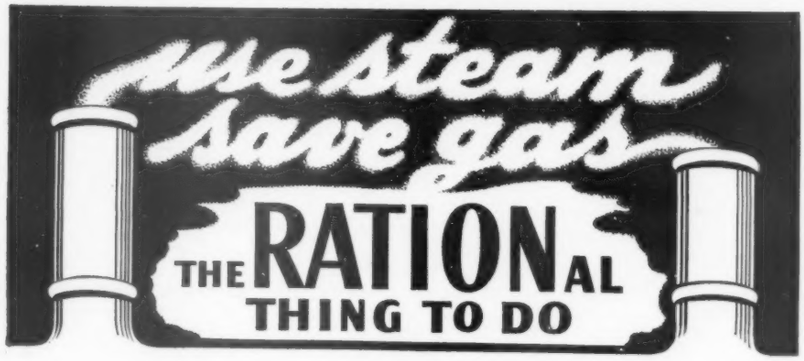

EVERY KIND OF CONSTRUCTION EQUIPMENT

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1—Size 12 x 12 Type NSS Chicago Pneumatic Steam Air Compressor, rated 387′ @ 125 lbs. working pressure. Serial No. 5714.

1—Size 10½ CC Westinghouse Air Compressor, capacity 150′ @ 100 lbs. working pressure.

1—Size 9 x 11, Type GSS Chicago Pneumatic Steam Air Compressor, capacity 130′ @ 100 lbs. working pressure.

1—Size 11 x 10½ x 12 Westinghouse Air Compressor, steam operated, capacity 75′ @ 100 lbs. working pressure.

1—Size 8 x 8 x 10 Westinghouse Steam Air Compressor, rated 35′ @ 100 lbs. working pressure.

CRANES & SHOVELS (STEAM)

2—Type B-2 Erie steam Caterpillar Cranes, Serial Nos. 4372 and 4027, with 50′ booms and equipped ASME boilers. Can furnish with shovel attachments.

ENGINES (STEAM)

1—194 HP Greenfield double cylinder steam engine, size 11 x 12″. 250 RPM.

1—25 HP Orr & Sembower single cylinder vertical steam engine No. 31534, size 10 x 10″. Class B, 160 RPM.

1—12 HP Wachs vertical steam engine, size 7½ x 8. Speed, 200 RPM.

2—12 HP O & S engines, sizes 7 x 8½″, Serial Nos. 25589 and 25588.

1—10 HP O & S Vertical Engine, Serial No. 6621, size 7 x 7″. 200 RPM.

3—9 HP O & S vertical steam engines, Serial Nos. 49090, 6837, and 26317. Class F. Size 6½ x 7½″. Speed, 225 RPM.

2—9 HP Wachs vertical engines, Serial Nos. 9416 and 5749. Size 6½ x 7″. Speed, 190 RPM.

1—7 HP O & S engine, Serial No. 481. Size 6 x 6″.

1—7 HP Dake steam engine, Serial No. 4992, for air or steam operation, size 3½ S Speed, 400 RPM.

1—6 HP O & S steam engine type F, size 5 x 7½″. Speed 250 RPM.

1—5½ HP Cyclone steam engine, size 5 x 7″. Speed, 225 RPM.

HOISTS (STEAM)

THREE DRUM (With or Without Boiler) Double Drum and Single Drum

3—9 x 10″ 3-drum Mead-Morrison Steam Hoists. Serial Nos. 17747, 15585 and 14577. Skeleton type. Hoist rated 9,200 lbs. line pull.

1—8½ x 10″ 3-drum Lambert steam hoist. Serial No. 13366, hoist rated 8090 lbs. line-pull.

1—8¼ x 10″ American 3-drum steam hoist, rated 8,500 lbs. line pull.

1—7¼ x 10″ 3-drum Mundy steam hoist. Serial No. 10756, skeleton type. Hoist rated 6,500 lbs. line pull.

1—8¼ x 10″ Mundy 3-drum steam hoist, Serial No. 14172. Hoist rated 8,000 lbs. line pull.

1—7 x 10″ American 3-drum steam hoist. Hoist rated 7,500 lbs. line pull.

1—7 x 10″ Lambert 3-drum steam hoist. Serial No. 9629. Hoist rated 5,000 lbs. line pull.

DOUBLE DRUM

1—8 x 12″ double drum Mundy steam hoist. Serial No. 11830. Hoist rated 8,500 lbs. line pull.

1—9 x 10″ Thomas double drum steam hoist. Hoist rated 9,000 lbs. line pull.

1—8¼ x 10″ National double drum steam hoist. Serial No. 4939. Hoist rated 8,500 lbs. line pull.

1—8¼ x 10″ Lidgerwood double drum hoist. Hoist rated 8,000 lbs. line pull. Serial No. 17882. Skeleton type.

1—8¼ x 10″ double drum Street cable-way reversible hoist. Hoist rated 2,800 lbs. line pull at 600 FPM.

1—8¼ x 10″ Street double drum steam hoist. Serial No. 1322. Hoist rated 8,500 lbs. line pull.

1—7 x 10″ Lidgerwood double drum Street hoist, skeleton type. Hoist rated 5,000 lbs. line pull.

1—7 x 10″ double drum Lidgerwood steam hoist. Serial No. 3050. Hoist rated 5,000 lbs. line pull.

1—7 x 10″ Lambert double drum steam hoist. Serial No. 8226. Hoist rated 5,000 lbs. line pull.

1—7 x 10″ Flory double drum steam hoist. Serial No. 5474. Hoist rated 7,000 lbs. line pull.

1—7¼ x 10″ double drum Mundy steam hoist. Hoist rated 6,500 lbs. line pull.

3—7 x 10″ American double drum steam hoists—Hoist Serial No. 732 U, 714 Q, and 710 U. Rated 7,500 lbs. line pull.

1—7 x 10″ Mead-Morrison double drum steam hoist. Serial No. 14635. Hoist rated 5,800 lbs. line pull.

2—7 x 10″ American double drum steam hoists. Serial Nos. 780 M and 776 M. 7,500 lbs. line pull.

1—7 x 10″ American double drum steam hoist. Hoist rated 6,500 lbs. line pull.

1—7 x 10″ Mead-Morrison double drum steam hoist. Serial No. 14659. Hoist rated 6,500 lbs. line pull.

1—6¼ x 10″ Lidgerwood double drum steam hoist. No. 70-1/3 capacity. 4,000 lbs. line pull.

SINGLE DRUM

1—8¼ x 10″ National single drum steam hoist. Serial No. 1294. Skeleton type. Capacity 8,500 lbs. line pull.

1—7½ x 10″ O & S single drum steam hoist, size 609. Hoist rated 5,000 lbs. line pull.

8—Holding Drums—Clyde, American, Thomas and Hayward.

PUMPS (STEAM)

1—10 x 6½ x 12″ Union horizontal single piston, boiler-feed pumps. Serial No. 9511. Capacity 172 GPM.

1—9 x 6½ x 10″ duplex horizontal steam pump. Rated 125 GPM.

1—7 x 5 x 10″ Platt Iron Works steam pump. Serial No. 78673. Capacity 200 GPM.

1—7 x 5 x 13″ Cameron steam pump, size 5, Serial No. 20128. Pump rated 130 GPM.

1—7 x 5 x 12″ Cameron horizontal direct-acting steam pump. Size 5 A. Serial No. 29205. Capacity 130 GPM.

1—6 x 4 x 10″ Wilson-Snyder horizontal duplex steam pump. Serial No. 2375. Pump rated 65 GPM.

1—10 x 6 x 10″ Worthington duplex steam pump. Serial No. 252361. Pump rated 209 GPM.

1—6 x 4 x 6″ Epping-Carpenter horizontal duplex steam pump. Serial No. 15658. Capacity 34 GPM.

1—6 x 4 x 8″ American single acting steam pump. Serial No. 97997. Capacity 50 GPM.

1—5¼ x 3½ x 5″ Worthington duplex steam pump. Serial No. 238169 W. Capacity 24 GPM.

1—5¼ x 3½ x 5″ Advance Pump and Compressor Co. duplex steam pump. Serial No. 25320. Capacity 24 GPM.

1—5 x 5 x 7″ Cameron single acting steam pump. Serial No. 62720. Capacity 82 GPM.

1—4½ x 2¾ x 4″ Worthington horizontal duplex steam pump. Capacity 21 GPM. Serial No. 622934 W.

1—3 x 2 x 3″ Worthington horizontal duplex steam pump. Serial No. 798163 W. Capacity 6 GPM.

1—3 x 2¾ x 3″ Canton-Hughes duplex steam pump. Capacity 15 GPM.

1—3 x 2 x 3½″ Buffalo-Springfield horizontal duplex steam pump. Serial No. 33372. Capacity 10½ GPM.

1—2½ x 1⅜ x 2″ Union horizontal single direct-acting steam pump. Serial No. 105843. Capacity 1½ GPM.

ALL THE ABOVE ARE BOILER-FEED PUMPS. WE HAVE THE FOLLOWING STEAM WATER PUMPS:

1—10 x 10 x 12″ Foster Simplex horizontal direct-acting steam pump. Serial No. 41201. Capacity 400 GPM.

1—6 x 6 x 6″ Platt Iron Works duplex steam pump. Serial No. 78878. Capacity 174 GPM.

1—5 x 5 x 5″ duplex horizontal steam pump. Capacity 75 GPM.

1—2 x 2 x 3½″ single acting horizontal steam pump. Serial No. 1472. Capacity 5½ GPM.

ROAD ROLLERS (STEAM)

1—10 ton 3-wheel Monarch steam road roller. Serial No. 1030. Rear rolls 64″ diameter x 22″ face. Front rolls 43″ diameter x 40″ face.

1—5 ton Iroquois tandem steam road roller. Serial No. 2160. Front rolls 30″ diameter x 38″ wide. Rear rolls 48″ diameter x 38″ wide.

1—5 ton Buffalo-Springfield double drive tandem roller. Serial No. 10288. Front rolls 36″ diameter x 39″ face. Rear rolls 42″ diameter x 43″ face.

1—5 ton Buffalo-Springfield single drive tandem steam road roller. Serial No. 11218. Front rolls 36″ diameter x 44″ face. Rear rolls 42″ diameter x 44″ face.

1—5 ton Pioneer tandem road roller. Serial No. 272. Front rolls 30″ diameter x 39″ face. Rear rolls 48″ diameter x 39″ face.

ALL THE ABOVE ROLLERS ARE COMPLETE IN EVERY RESPECT, WITH BOILER READY TO RUN.

SWINGERS

1—12 HP Lidgerwood, 6¼ x 8″ steel swinger, capacity 5,000 lbs. LP.

1—10 HP Lambert steam swinger, size 5½ x 8″, link motion, capacity 8,000 lbs. LP. 1—50 FPM.

2—10 HP Mead-Morrison steam swinger, size 4¼ x 6″, capacity 7,000 lbs. LP. 60 FPM.

1—10 HP Dake steam swinger, size 4, capacity 8,500 lbs. LP.

1—10 HP Lambert link motion swinger, size 5½ x 8″, Class D, capacity 3,400 lbs. LP.

2—10 HP Mead-Morrison swinger, type 131, size 4½ x 6″, capacity 7,000 lbs. LP. 60 FPM.

1—10 HP Lambert Class D, size 5½ x 8″, link motion steam swinger, capacity 8,000 lbs. LP. 50 FPM.

2—7 HP American steam swinger, size 4 x 5″, capacity 4,000 lbs. LP.

4—7 HP Dake steam swinger, size 3½S, capacity 5,775 lbs. LP. 30 RPM.

1—6 HP Lidgerwood steam swinger, size 5 x 6″, 2 spool type, capacity 4,000 lbs. LP.

1—Size 5 x 7″ American steam swinger, capacity 6,000 lbs. LP. 80 FPM.

1—Size 6 x 7″ Marion double-cylinder swinging engine.

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1160 S. WASHTENAW AVE.

PITTSBURGH
P. O. BOX 933 DEPT. PQ

EQUIPMENT CORPORATION of AMERICA

PHILADELPHIA
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For Sale—A Good Time to Buy

Dragline—Mon. 3W—diesel.
Bucket 7 yd. Bucyrus dragline.
Shovel—Crane comb. Bucyrus 50B, steam.
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Dump Cars (25) air control 12 yd.
Core drill Sullivan 21—gas drive.
Barges—2 steel 130x30 also 4 wood 100x22.

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NEED DUMP CARS?

Immediate Delivery:

12, 24-yd. Koppel
24, 16-yd. Western
9, 16-yd. Kilbourne & Jacobs

Illustrated specifications available—**Other Types of Cars Too. Also Locomotives, Cranes, Shovels, Etc.**

IRON & STEEL PRODUCTS, Inc.
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"ANYTHING containing IRON or STEEL"

FOR SALE

2—Trackson Company 10-12 cu. yd. Crawler Wagons, Model No. 7-DW, Serial Nos. 575 & 576.

Price $500.00 each f. o. b. Pittsburg, Kansas.

UNITED IRON WORKS COMPANY
Pittsburg, Kansas

FOR SALE

1 Farrell Type B 6"x20" crusher in fair operating condition. Price $400.00.

1 Universal Type M Heavy Duty screen size 42"x72". Condition good as new. Price $200.00

Box 1209
PIT AND QUARRY PUBLICATIONS
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One complete lime hydrating plant, including five ton hydrator, a 10' Raymond Separator, a No. 0 Raymond Automatic Pulverizer, cyclone piping, etc.

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500 Ft. Second Hand Conveyor Belt, 48 Inch, 9 Ply, 32 Oz., 3/16" Top, 1/32 Bottom Cover.

ROGAN & ROGAN CO.
Middlesboro, Kentucky

DEPENDABLE USED MACHINES

Lorain 75B shovel, rebuilt
Link Belt K-2 crane
18x25 self-propelled conveyor
18x40 portable conveyor
Int. T-40 with Bucyrus bulldozer
Haiss loader
Sand tanks, washers, pumps, screens, etc.

TRACTOR & EQUIPMENT COMPANY
3515 W. 51st St. Chicago

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14	4	3/32	1/32
16	4	3/32	1/32
18	4	3/32	1/32
20	4	3/32	1/32
24	4	3/32	1/32
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2—6 1/4x3—AB	4.15	4—21 5/8x2—C	20.75	
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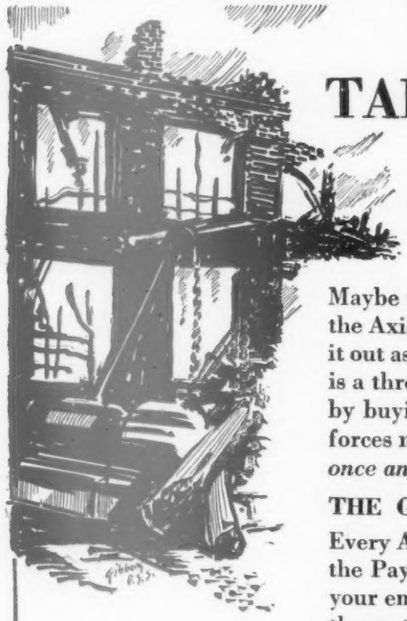

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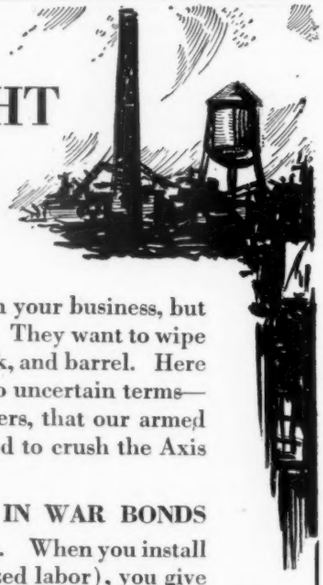

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42"	5	1/8" — 1/16"
36"	6	1/8" — 1/16"
30"	6	1/8" — 1/16"
30"	5	1/8" — 1/16"
24"	5	1/8" — 1/32"
24"	4	1/8" — 1/32"
20"	5	1/8" — 1/32"
20"	4	1/8" — 1/32"
18"	4	1/8" — 1/32"
16"	4	1/8" — 1/32"
14"	4	1/16" — 1/32"
12"	4	1/16" — 1/32"

TRANSMISSION BELTING HEAVY-DUTY— FRICTION SURFACE

Width	Ply	Width	Ply	Width	Ply
18"	6	10"	6	6"	5
16"	6	10"	5	5"	5
14"	6	8"	6	4"	5
12"	6	8"	5	4"	4
12"	5	6"	6	3"	4

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Width	Ply	Top & Bottom Covers
12"	6	1/16" — 1/16"
14"	6	1/16" — 1/16"
16"	6	1/16" — 1/16"
18"	6	1/16" — 1/16"

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Index to Advertisers

*Allis Chalmers Mfg. Co.....12-13
*American Cable Div. American Chain & Cable Co., Inc.....
.....Inside Back Cover
*American Chain & Cable Co., Inc.....Inside Back Cover
American Manganese Steel Co... 63
*American Pulverizer Co.....90
Anchor Concrete Mchy. Co..... 82
Atlas Powder Co..... 93
*Austin-Western Road Machinery Co. 14

Bacon, Inc., Earle C..... 66
*Barber-Greene Co. 2-3
Birmingham Rail & Loco. Co..... 94
Blue Ball Machine Works..... 96
Boehck Equipment Co..... 98
Brill Equipment Corp.....101
Broadcast Section 94-103
*Brooks Equipment & Mfg. Co... 92
*Buda Co., The..... 15
*Buell Engineering Co., Inc..... 24
*Butler Bin Co..... 84

Carlyle Rubber Co., Inc.....94-103
Chicago Perforating Co..... 70
*Chicago Steel Foundry Co..... 68
Cleveland Wire Cloth & Mfg. Co. 93
Commercial Shearing and Stamping Co. 82
Concrete Transport Mixer Co..... 86
Consolidated Products Co., Inc... 96

*Dempster Bros., Inc..... 92
*Denver Equipment Co..... 92
*Diamond Iron Works, Inc..... 60

*Eagle Iron Works..... 91
*Easton Car & Construction Co... 1
*Ensign-Bickford Co., The.....20
Equipment Corporation of America 94-99

Foster Company, Benjamin..... 94
*Fuller Co. 10

Gates Rubber Co., The..... 6
*Gruendler Crusher & Pulverizer Co. 70

Haiss Mfg. Co., Inc., Geo..... 70
Hallowell, Horace J.....102
*Hardinge Co., Inc..... 66
Harnischfeger Corporation 19
Harris Lime Company..... 96
*Hendrick Mfg. Co..... 92
Hoffman Bros. Drilling Co.....102

*Iowa Manufacturing Co..... 89

*Jackson & Church Co..... 86
Jaeger-Lembo Machine Corp., The. 94
*Jaeger Machine Co., The..... 83
*Jeffrey Mfg. Co..... 86

*Kennedy-Van Saun Mfg. & Eng. Corp. 72
Kenney Mach. Co., George C...101
Kent Machine Co..... 82
Koehring Company 8

Lafayette, Hotel 92
*Laughlin Co., Thomas..... 93
Lefton Industrial Corp..... 96
*Link-Belt Co. 93
Ludlow-Saylor Wire Co.....
.....Inside Front Cover

Mack Trucks 21
Marion Steam Shovel Co., The.. 17
Master Builders Co., The..... 88
*McLanahan & Stone Corp..... 93
*Morris Machine Works..... 65
*Multiplex Concrete Machy. Co... 86

Neff & Fry Company..... 86
New Holland Machine Co..... 68
*Nordberg Mfg. Co..... 4
Northwest Engineering Co..... 5

*Owen Bucket Co.....104

Patterson Equipment Co..... 98
Pennsylvania Drilling Co.....102
Pettibone Mulliken Corp..... 18
Philadelphian, Hotel 84
Porter Co., H. K.....
.....Outside Back Cover

Raybestos-Manhattan, Inc. 7
*Raymond Pulverizer Div. of Combustion Engineering Co., Inc... 22
*Roebling's Sons Co., John A.... 71

*Sauerman Bros., Inc..... 82
Schaffer Poidometer Co..... 70
Scully Steel Products..... 90
Shannon & Company, J. Jacob.. 91
Simplicity Engineering Co..... 91
*Smidth & Co., F. L..... 92
*Smith Co., T. L..... 87
Smith Engineering Works..... 9
Southern Iron & Equipment Co..103
Standard Metal Mfg. Co..... 93
Stanhope, Inc., R. C.....95-103
*Stearns Mfg. Co..... 73
Stoody Co., The..... 62
Swift, Inc., William P.....101
*Syntron Co. 84

Taylor Forge & Pipe Works.... 16
Teuscher Pulley and Belting Co..101
Thermoid Rubber Co..... 11
Thornton-Tandem Co. 67
*Traylor Engineering & Mfg. Co.. 61
Truckstell, Inc. 69
*Tyler Co., The W. S..... 66

*United States Steel..... 90
*U. S. Treasury Department.....102
Unverzagt & Sons, G. A..... 96

Walsh Co., R. P..... 98
Webber Equipment Co..... 94
Wellman Engineering Co..... 90
Whayne Supply Co., R. C..... 97
*Williams Pat. Crusher & Pulverizer Company 104
Wing & Son Corporation, R. B.. 96

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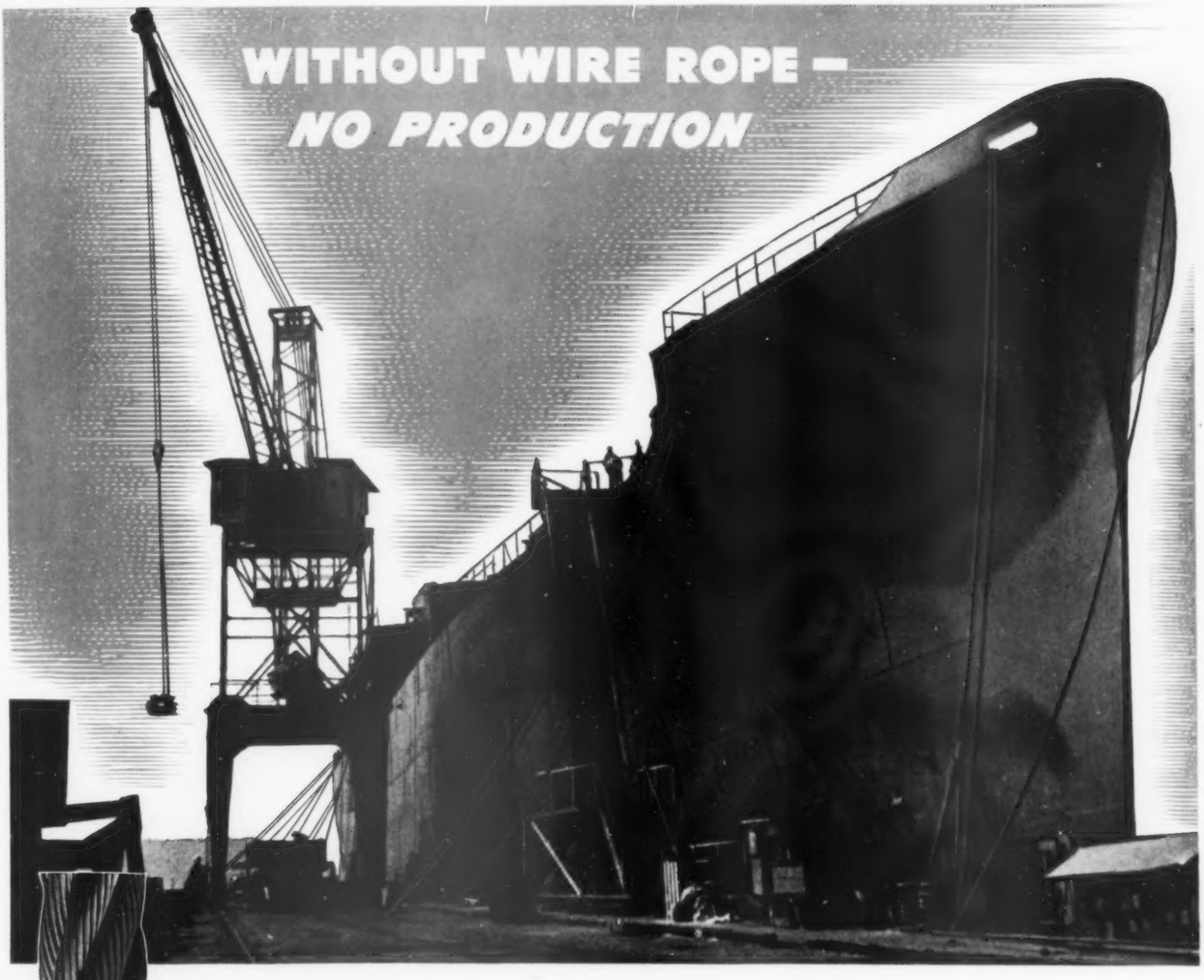

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